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BRANCH OFFICES

GLASGOW: 139, Bothwell Street, C.2 Central 4646

NEWCASTLE-ON-TYNE: 21, Mosley Street Newcastle-on-Tyne 22239

MANCHESTER: Century Insurance Building, St. Peter's Square Central 7667-8-9

BIRMINGHAM: 90, Hagley Road, Edgbaston Edgbaston 2466

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Unfair to Railways—or, Pattern in Repeat

ACCORDING to Mr. John Hay, Joint Parliamentary Secretary to the Ministry of Transport, the Government wants to see "a highly modernised road system and a highly modernised railway system" in free competition. It would be wrong to persuade or direct people to use the railways rather than the roads, even though these are clogged and the railways are not paying their way. Mr. Hay was speaking in the debate on road traffic in the House of Commons on July 28. The Government's idea of fair competition is unique: the money scheduled for expenditure on railway capital investment, including modernisation, during the next three years is liable to at least partial forfeit on the recommendation of the Stodford Committee now in secret session, whereas that promised for the roads by Mr. Ernest Marples, Minister of Transport, has no such strings attached. Asked to explain how this allocation tied up with the views of the Chancellor of the Exchequer, Mr. Marples blandly replied: "So far as I am concerned, this has been authorised and this is going to be done." How nice to have the Minister on one's side in this way, especially when his department's procedure otherwise is so similar in respect both to railways and roads: referring to the M.1 motorway, the second report of the Committee of

Public Accounts states: "The Ministry of Transport informed Your Committee that the provisional estimates which proved so inadequate were really no more than inspired guesses." The £5½ million Hyde Park Corner scheme now in progress was threatened with curtailment on the eve of its commencement and after it had been approved. All this has a very familiar ring to anyone interested in railway modernisation. One small crumb was offered to the British Transport Commission by Mr. Marples: although apparently unmoved by the fact that the £10 million annual Government subsidy to the airfields enables British European Airways to compete favourably with British Railways passenger traffic to Scotland, the Minister promised a closer control on heavy vehicles so that at least some abnormal indivisible loads will be moved by rail or sea. In other words, unsuitable traffic is to be pushed on the railways whether they like it or not. During the debate, a Scottish Member adjured Mr. Marples to keep out of Scotland. South of the border, we can only regret our inability to echo this injunction on our own account—like the poor, Mr. Marples seems always to be with us.

New Look ?

IN a written answer to Mr. Geoffrey Wilson, Conservative Member for Truro, Mr. Ernest Marples, Minister of Transport, stated that the British Transport Commission's accounts for 1960 would provide a basis on which the total payment of voted money for the following year could be determined. For interim payments, the Commission would provide supporting evidence in the form of periodic returns on which the Minister could satisfy himself or inquire further into the case for meeting the Commission's requirements. Mr. Marples wished to make it clear to the House that, in making the payments, he was not assuming any managerial responsibility from the Commission, which must be left to conduct its affairs with a proper sense of financial responsibility. Although he expected to be consulted about developments which might materially affect the sum to be provided, the Commission must remain primarily responsible for the financial results of the year. The change from loans to outright payment of voted money necessitated a close look at the amounts sought by the Commission. We think this might be an advantage—it could save time and temper later on.

World Bank Loan for Indian Railways

THE loan to the Indian Government of \$70,000,000 (about £26,000,000) approved last week by the World Bank for acquirement abroad of motive power, rolling stock, and other railway equipment provides most of the foreign exchange needed to implement the last phase of the railway programme in the Second Five-Year Plan. The plan is due for completion by March 31, 1961. The loan brings the total lent by the World Bank for Indian railways to £328,000,000, the largest amount ever lent by the bank for a single project. It is for a term of 20 years and bears interest of 5½ per cent. Six private American commercial banks are contributing to it just over £2,000,000. As regards the railways, the aim of the plan is to increase freight capacity from 114,000,000 to 162,000,000 tons a year, and to augment passenger capacity by about 15 per cent. Among the most important objectives are the acquisition of 2,161 locomotives, 8,836 passenger coaches, and 111,739 goods vehicles, doubling of 1,300 miles of main line and replacement of 8,000 miles of track, construction of 830 miles of new lines, and electrification of 886 miles of main line. There is no restriction as to the source of motive power and other material acquired with the help of the loan.

G.E.C. Railway Activities

DURING the year ended March 31, 1960, the General Electric Co. Ltd. was active in executing railway orders. The trading profit was £11,074,000, an increase of £1,720,000 compared with the preceding 12 months, and the board, of which Sir Leslie Gamage is Chairman, recommends a total dividend of 10 per cent, as for last year. For British Railways the first five of ten G.E.C./North British 25-kV. locomotives are now in service, and delivery of the 71 25-kV. multiple-unit trains with G.E.C. electrical equipment is nearing completion. The company supplied electrical power equipment for the five

diesel-electric Pullman trains. For London Transport Executive it is providing over 2,400 traction motors for rolling stock on several Underground lines. Equipment for four-car 1,500 V. d.c. electric trains was ordered for the Estoril Electric Railway, Portugal, and the G.E.C. has supplied switchgear and transformers, cabling, and other equipment for the Lisbon underground railway. Pirelli-General cable is being used extensively for the Southern Region Kent Coast electrification. The Siemens & General Electric Railway Signal Co. Ltd. provided signal equipment between Farningham Road and Sheerness, Southern Region; it has also completed re-signalling of Huddersfield Station. On South African Railways S.G.E. has installed automatic and colour-light signalling.

Financing the Channel Tunnel

SINCE the report of the Channel Tunnel Study Group was submitted to the British Government in March, the Group has revised its financial proposals and submitted a memorandum to the British and French Governments. The intention is to relieve the railways of any financial burden in construction of the tunnel; to make clear that shareholders would assume the full risk on their investment; and to remove provision of certain direct guarantees and assurances from the Governments concerned. When the Group was preparing its report, it assumed that British Railways and the French National Railways wished to finance terminals and other ancillary facilities. Such an investment did not seem likely to be a burden on the railways, as the cost of ancillary facilities would be met by revenue from the tunnel, and the capital cost would be more than offset by the railways avoiding further outlay on ships and ports. To replace and extend railway ships, ferries, and port facilities would cost £20,000,000 by 1966. It is believed that the British Government views with reluctance the British Transport Commission's undertaking substantial investment obligations as to a channel tunnel in view of the capital requirements of British Railways for other purposes; but the Group is prepared to provide not only the capital cost of the tunnel, but also the entire £24,000,000 needed for terminals. This would bring the total of private financing of the scheme to some £130,000,000.

No Government Guarantees Required

THE Study Group believes that it would be possible to market the Channel Tunnel Company bonds without Government guarantees if a head-lease of the tunnel were entered into directly by the Governments for an amount to cover the interest on, and amortisation of, the outstanding bonds. A head-lease should meet the legal requirements for bond issues in the countries concerned and the tunnel could be financed in world markets without the direct guarantees called for by the original proposals. Some three-quarters of the finance is expected to be obtainable from French, U.S.A., and other overseas investors. That should allay the fears of those who feel that the scheme deserves low priority compared with other railway and road projects in Britain. The Chairman of the company Mr. Leo D'Erlanger, is sure that if Governments "can be moved by reasoned argument" the tunnel will be open to traffic by 1965. Both Governments concerned will require the financial implications to be examined very thoroughly.

Canadian Railways Help Immigrants

RAILWAYS in Canada have long helped to settle the immigrants which they transport to the interior of the Dominion. The Canadian Pacific Railway, which also conveys many settlers from Europe to Canada in its own ships, has a Department of Immigration & Agriculture at its headquarters in Montreal, and a European Colonisation Manager at its European organisation headquarters in London. The Canadian National Railways management includes a Director of Colonisation & Agriculture in Montreal, who also is represented in its European General Manager's Office in London. In the past 32 years the C.N.R. Colonisation & Agriculture Department has settled some 75,000 families on nearly 11,000,000 acres of newly broken land and in some cultivated areas, and conveyed by rail about 1,350,000 immigrants. Help to settlers is followed up by steps to keep in contact. In many places C.N.R. employees participate in

developing citizenship councils throughout the country. Their main object is to foster good citizenship and to provide information to newcomers on all aspects of Canadian life. In Montreal this year the celebrations included presentation of citizenship certificates to new, and to 21-year-old Canadian-born, citizens. Two members of the C.N.R. Colonisation & Agriculture Department, Mr. C. D. James, Manager, and Mr. T. G. Sevigny, Assistant to Manager, took part in the ceremonies.

Better Winter Service to the Continent

THE 1960-61 winter timetable incorporates several welcome improvements in services between Britain and the Continent. Morning arrivals at resorts in the Grisons, the Tyrol, and the province of Salzburg, with more time for winter sports, are afforded by the new "Alpen Rose" express next winter. This will connect with the 10 a.m. service from Victoria. Inconveniently early arrivals at Landquart and Chur, where connections are made with Rhaetian Railway trains to Davos and the Engadine respectively, are avoided by holding the Chur vehicles at Sargans, the point of division between the Schwarzach and Chur portions. The afternoon service from Victoria to Paris via Calais will leave at 2.30 p.m., allowing a full morning in London and better connections from the North of England. Another development which will help passengers from and to Britain is the running of through carriages between Rome and Paris Nord, with cross-platform interchange with Calais boat trains at the latter terminus.

Belgian Electrification Extensions

THE Belgian National Railways is reported to have decided on electrification at 3,000 V. d.c., as for its lines already converted, of the sections from Erquelines, near the French frontier on the main line from Paris, to Charleroi, and from Liège to the German frontier at Hergenrath. The former line links up at Erquelines with the French National Railways. The latter system is converting its main line from Paris to Aulnoye, not far short of Erquelines, at 25 kV., 50 cycles. No plans are announced for electrification from Aulnoye to Erquelines, but it would be logical to use 3,000 V. No mention has been made recently of conversion from Charleroi to Liège, which would form another link in an electrified route from Paris to Cologne. For the Liège-Hergenrath section 3,000 V. has been adopted partly because it is standard for the S.N.C.B. and partly no doubt because of difficulty in obtaining clearances for high voltages through the many tunnels. If the German Federal Railway electrifies to Hergenrath, it will probably extend its 15,000-V., 16 $\frac{2}{3}$ -cycles system. There is evidently ample scope for multi-voltage locomotives and multiple-unit trains.

"Piggy-Back" Transport Possibilities

THE apparent success of the "piggy-back" or trailer-on-flat-car service throughout the entire North American continent is borne out by the fact that it is firmly established on 42 per cent of the mileage of Class I railways in the U.S.A. During the first seven months of 1959 there was an increase of no less than 126 per cent in the number of wagon-miles compared with the same period in 1958, on the railways concerned. In many countries loading-gauge limitations may preclude use of the North American form of road transport vehicle carried on railway wagons, but the exact form is adjustable to local conditions. The principle is adaptable to the needs of many countries, and especially to those where breaks of gauge are prevalent. It eliminates break of bulk, transshipment and damage to consignments if not temporary storage also. It is planned to play an important part in transport through the Channel Tunnel.

United Steel University Scholarships

TO promote scientific research and technical advance in iron and steel manufacture, the United Steel Companies Limited are to offer up to 10 university scholarships a year, tenable at any university in the United Kingdom. Each will be of an annual value of £500, not affected by parental income; the scholarships will be offered to boys proceeding to a university to take full-time courses leading to approved

degrees in science or engineering. The company also will consider applications from non-science students, for it recognises the place in industrial management for the good arts graduate. Arrangements will be made for successful candidates to receive industrial experience with the company before going up to the university and also to undertake vacation work in industry. Besides the scholarship, students will be paid subsistence allowance during industrial training. Applications will be considered from boys in their last year at school who have achieved the necessary academic standard and have also been offered a place at a university. Character, initiative, and independence of mind are amongst the qualities sought. On completion of their degree courses, scholars will have the opportunity of joining the company's graduate training scheme, and during this period they will be paid salaries at the current rates for graduate apprentices.

North Eastern Freight Traffic

THIS week, we publish two linked articles which describe, respectively, specialised freight-carrying and freight rate-making in the North Eastern Region of British Railways. From these articles, it is clear that the Region is taking full advantage of the increased autonomy which is being granted to all sections of British Railways. Highly-qualified district sales organisations with specialist salesmen and specialist rates consultants maintain close contact between headquarters and district staffs to ensure unity of policy and practice, and well-furnished reception rooms make an initial good impression on potential customers which is later substantiated by good service. The development of wagons specifically designed for various traffics has enabled the range of bulk conveyance to be widened and today this form of traffic covers cement, chemicals and solvents, pulverised fuels, feeding stuffs, grain fertilisers, salt, sugar, beer, milk, cider, and clothes. The new traffic offices at Middlesbrough described last week provide a good example of the efficient, streamlined traffic working in the Region which is resulting in a co-ordinated effort by all parts of the organisation.

The Potentialities of Translucent Ceilings

SINCE 1954 illuminated ceilings have become increasingly popular in this country. They blend very well with the contemporary architecture and design, and, from a practical point of view, they have considerable advantages over conventional ceilings and other forms of lighting, basically because they provide an even diffusion of light. By preventing glare and depressing shadows, this form of illumination reduces fatigue and eye-strain, and consequently assists more efficient work. It also has very obvious advantages for commercial display. Secondary considerations are that most forms of illuminated ceiling provide thermal insulation, and, in the case of large, uneconomical roof spaces, can cut heating costs by as much as 40 per cent. Moreover many of these ceilings readily lend themselves to combination with air-conditioning and acoustics systems, and have the further advantage of concealing the ducts, power lines, and pipework that are so often the unsightly concomitants of those installations.

Over-running a Colour-light Signal

COLONEL McMULLEN'S report on the double collision at the extremely busy Borough Market Junction on January 28, 1960, makes it clear that it happened because a driver over-ran a colour-light signal, mistaking it for one on an adjacent line. Three trains were involved. Colonel McMullen finds it difficult to understand how this driver, who was in good health and knew the route well, committed this lapse. Nevertheless the curvature of the line and the existence of bridge girders make it difficult to adjust these signals for the most advantageous sighting. Colonel McMullen therefore recommends that the signal concerned should be given a wide angle lens—even at the cost of slightly reducing its brilliance. He also suggests the provision of co-acting detonators and the extension of the approach locking of these signals back to the point where they first come in sight, this being in accordance with modern practice. Colonel McMullen rightly pays a high tribute to the way in which the Southern Region coped with the dislocation caused by this accident.

London Transport in 1959

THE fact that London Transport paid its way in 1959, meeting in full all operating costs and interest charges on capital, and ended the year with a small surplus of £30,000, is satisfactory in the circumstances. This is pointed out in the annual review "London Transport in 1959." The 80-page current issue of this informative and well-illustrated record of, and commentary on, many spheres of London Transport Executive activity is the second to be made available to the public at the modest price of 2s. 6d. It was first issued some years ago mainly for senior staff of L.T.E., but was rightly thought to deserve a much wider readership. The issue covering 1959 is the first to appear under the authority of Mr. A. B. B. Valentine, who assumed office as Chairman of London Transport Executive on July 1, 1959, on the retirement of Sir John Elliot. It is divided into four sections devoted to results for the year; new works and developments; staff matters; and future prospects.

Although the year's working results, taken by themselves, are stated to be satisfactory, and significant developments on both road and rail sides were begun, it became increasingly difficult on the roads to maintain regularity of services because of growing traffic congestion and increasing staff shortage. L.T.E. gross receipts for 1959 totalled £81,100,000, of which £79,200,000 was derived from fares and £1,900,000 from other sources such as commercial advertising and rents. Working expenses were £75,070,000, and net receipts £6,000,000. This enabled the L.T.E. contribution, amounting to £6,000,000, to the central charges of the British Transport Commission to be met in full. The improved financial position for 1959 was the result not only of the elimination of the 1958 bus strike loss, but also of economies to the value of £3,600,000 made in services to take account of a fall in passenger traffic; increases in fares which realised £1,000,000; and of a saving of £400,000 from the Budget reduction in bus and coach licence duty. These savings were partly offset by increased expenditure of £1,100,000 for higher wage and other costs and a reduction of £1,800,000 in receipts due to continued shrinkage of traffic. The review states that the road services never fully recovered from the bus strike. Irregularity of running services caused by increasing street congestion and serious bus crew shortage had worsened the situation. The Underground carried 669,000,000 passengers in 1959, 0.4 per cent more than in 1957, but 3.4 per cent less than in 1958 when Underground traffics were up because of the strike. The results indicate serious declines in the travel habit and in the volume of travel by public transport, resulting mainly from the substantial growth in the ownership of private vehicles.

Among the many developments mentioned are extension of the Metropolitan Line from Rickmansworth to Amersham and Chesham. Work was well advanced by the end of 1959. Alterations had been made to the track layout and signalling at Chorley Wood and Chalfont & Latimer, where new substations had also been built and were being equipped with modern plant. Partly in connection with the general modernisation of the electric power distribution system, the existing Croxleyhall substation was being re-equipped. At Amersham, which is to be the terminus for the L.T.E. service, with interchange with British Railways, extensive alterations were well advanced by the end of the year. Electrification is due to be completed later this summer. Quadrupling between Harrow-on-the-Hill and Watford South Junction was started in the autumn of 1959. Re-signalling was completed over a large part of the 12-mile eastern section of the District Line from Bow Road to Upminster, as were the civil engineering works by the Eastern Region at Barking, to segregate L.T.E. and British Railways trains so as to improve punctuality between the L.T.E.-Eastern Region, British Railways, boundary near Bow Road and a point beyond Plaistow. The new equipment was brought into use in October. Work on further sections covering the remainder of the line to Upminster is proceeding. Construction work by the Eastern Region at Barking proceeded during the year in connection with the London, Tilbury & Southend Line electrification and in November the new fly-under and fly-over for westbound District Line trains were brought into use.

As regards the Victoria Line, sub-soil characteristics have been checked by boreholes, and the preparation of detailed surveys and plans is now well advanced. Schemes for nine out

of the 13 stations have been approved and contract drawings are being prepared by the consulting engineers, Sir William Halcrow & Partners and Messrs. Mott, Hay & Anderson. Negotiations are in progress with British Railways on the detailed design of the sub-surface stations at Euston and Kings Cross. It should be possible for the first contracts to be placed within a few months of a decision to proceed with the line. Powers are being sought in Parliament to make further alterations to the Northern City Line tunnels at Highbury so as to afford cross platform interchange with the Victoria Line.

Authority was given in 1959 for experimental tunnels to be constructed to test new designs of running tunnel linings in concrete and cast iron. Contracts for tunnelling have been let to Kinnear Moodie & Co. Ltd., and Edmund Nuttall, Sons & Co. Ltd. for construction between Finsbury Park and Seven Sisters of about half-a-mile of twin tunnel to each experimental design.

Delivery of 13 new surface-stock cars in mid-1959 enabled all Circle Line trains to be increased from five to six cars. After experience with the three lightweight prototype trains of tube stock supplied in 1957 and 1958, delivery began at the end of 1959 of 532 new cars. By the end of the year three trains had been received the first of which was put into service on the Piccadilly Line. These trains, which are being supplied by the Metropolitan-Cammell Carriage and Wagon Co. Ltd., are similar to the prototype trains. Some of this stock will run on the Piccadilly Line, and some on the Central Line. Plans are now being prepared to order more stock of this type, to enable all the old stock on these two lines go be replaced. In all, compared with 1957, the total capacity of the trains on the Central Line will have been increased by some 25 per cent, and on the Piccadilly Line by 10–15 per cent. Nearly all the remaining seven-car trains on the Central Line have already been replaced by trains of eight cars.

Cravens Limited is building 248 surface-line cars of new design, required to replace old stock and enable an increased service to be given on completion of the Metropolitan Line improvements. These cars will be of saloon type with air-worked sliding doors and 40 per cent more seats than the existing design of standard Underground saloon car. Twelve prototype motor cars, to a new design more advanced, the report states, than has yet been seen on the Underground, are also being built by Cravens Limited, and it is hoped that this stock will constitute a basis for the tube line rolling stock of the future. All axles will be motored, plastics will be employed extensively inside, and bodies will be of semi-integral construction. It had been thought originally that this new design of car could replace the old stock on the Central Line, but in view of the many advanced features in the design, extensive service tests must be undertaken. Delay in production of the prototypes means that it will not be possible to complete test running before bulk orders must be placed for stock for the Central Line.

Experimental work has been in progress with the object of braking trains electrically and of returning energy which can be used by other trains instead of dissipating it in friction and heat at the brake blocks. This work has been completed. The prototype trains being built by Cravens Limited had been designed so that this form of braking could be incorporated at a later date, but experiments have shown that the extent of modifications necessary to change over to this form of braking would be uneconomic when applied to existing Underground stock.

Among subjects for research has been the formation of ice on conductor rails on the open sections of the Underground. Thermal lagging of conductor rails as an alternative to the use of de-icing fluids has proved ineffective in service conditions. Accumulation of data on minimum temperatures reached by conductor rails is being continued, and large variations have been found in the rail temperatures at different places. Strain gauges have been used and oscillograph records made to help to determine the vertical impact forces imposed by the wheels of trains on the rails at rail joints, and the effect of this impact on axle-hung traction motors. This information, obtained for different kinds of track and bogie, will be useful in connection with suspension and metal fatigue problems. The smoking habits of passengers on Underground trains were examined in 1959, as a result of which the proportion of non-smoking accommodation is being increased.

Experience with Light-Alloy Railcars

WHEN considering the merits of complete body construction in light alloy for diesel railcars the balance of justification for it as opposed to steel construction must rest largely with the commercial advantages of a livelier performance over difficult routes where engine power is restricted by vehicle length, rather than with the reduced cost of long-term maintenance obtained by corrosion-resistance of the material. This opinion is expressed by Mr. A. E. Robson, Chief Mechanical & Electrical Engineer, British Railways, London Midland Region, in a paper, "British Railways experience with light-alloy railcars," read at the aluminium symposium held jointly by Institution of Locomotive Engineers and the Aluminium Development Association on May 27 in London. Reference to the symposium has been made in several recent issues.

To form a basis for much of the information in his paper Mr. Robson has been able to draw on extensive experience of British Railways of building and operating both light-alloy and steel railcars during the past seven years for a wide variety of service conditions. In fact, it is claimed that the 550 lightweight vehicles which will be operating in the various Regions of British Railways by the end of this year, all originating at Derby Carriage & Wagon Works, London Midland Region, will be the largest light-alloy passenger fleet owned by any main-line railway administration. The total of similar vehicles in steel construction will by then have reached about 3,000 but as many of this number are supplied by contractors, there is no clear basis for straightforward comparison in first cost. Nevertheless, apart from the higher cost of material it is clear that light-alloy construction must have greater man-hour content than comparable designs in steel, dependent on the quantities built.

The main conclusion reached is that light alloy gives very good service in railway coach structures provided adequate surface protection is given against corrosive atmospheres; for external protection an anodised finish is not sufficient especially for coaches on surface lines in Britain. But light alloy is stated to be unsuitable for applications where there is abrasion as at gangway facings, or in which shock-loading occurs as with buffers; it is recommended that headstock assemblies should be entirely of steel. The 30 per cent saving in weight of an aluminium-alloy integral body structure of British Railways relative to a comparable design in steel is not as effective in reducing train resistance and fuel consumption as might be expected. This is partly because of the large proportion of the total weight represented by the use of steel bogies of conventional design so that the overall weight reduction of a complete power car is hardly 7 per cent. Even so, the saving in operating cost, assuming a mean fuel saving of 7.5 per cent or, say, 0.024 gal. per mile per twin-car set, with fuel oil at 1s. 2.125d. per gal. can be about £14 per 10,000 twin-car miles a year.

Maintenance costs in respect of atmospheric corrosion are lower with light-alloy than with steel structures, but as the cost of all such work does not average more than about £35 per annum for each steel vehicle, allowing for complete re-paneling of the body once during a life of 30 years, this represents the upper limit of saving which light alloy could achieve even if it did not suffer any corrosion deterioration. The cost of material only for the light-alloy structure of the British Railways railcars is about £1,100 more than for the equivalent in steel. Thus to break even on material costs alone the operating mileage must be not less than 65,000 miles per vehicle per annum based on present-day fuel costs.

Production considerations at Derby determined that the underframe, body, and roof should be designed to form a complete shell from separate sub-assemblies with provision for some adjustment at the extruded sections forming the joints during assembly to allow reasonable dimensional tolerances. All holes in the underframe channel and other sections are drilled 1/16-in. undersize and opened up to size in the sub-assembly fixture, thus ensuring a fitted rivet prior to the forming operation.

The first railcars used light-alloy rivets throughout and soon after going into service the main points of the cross-bars, headstocks, and end diagonal members began to give trouble. This was not caused by the shearing of rivets as might have been expected, but by rivet heads popping off. The

trouble was reduced by altering the procedure used in lifting vehicles for maintenance purposes. Repairs to fractured headstocks can be carried out readily because the softer and lighter alloy is easier to handle than mild steel. On the other hand, as the material is fully heat-treated, deformation cannot be straightened *in situ* and must therefore be cut away and replaced by lengths of new material. This applies particularly to the heavier members such as sole-bars which remain distorted after being released from the restraint imposed by other parts of the damaged underframe. Conversely the lighter sections such as the outrigger plate usually spring back into their former shape. The steel headstocks and trimmers now fitted as standard equipment to reduce damage caused by minor collisions have increased the vehicle weight by about 5 cwt. All rivets in the underframe between the headstock and the bogie centre are also of mild steel, hot formed. The sealing effect of the heads of these rivets prevents the ingress of moisture, which makes it unnecessary to fit galvanised washers to prevent possible electrolytic corrosion.

British Transport Commission Traffic Receipts

BRITISH Railways goods traffic receipts continue to exceed only slightly those for the corresponding periods of 1959. For Period 7, the four weeks to July 17 they amounted to £23,438,000, compared with £22,678,000 last year, and with £22,982,000 for Period 6; the latter moreover included the Whitsun holiday. Mineral receipts for Period 7 exceeded the 1959 figure by nearly £500,000, as was to be expected in view of increased activity in the steel industry. Coal class traffic receipts declined, as was foreseen. Merchandise produced £7,922,000, against £7,529,000 last year, and £7,672,000 for the preceding four weeks. It is to be hoped that this amelioration will continue as goods services improve and further efforts are made to capture traffic. Mineral receipts may not continue to rise very much further, and merchandise traffic must be relied on as a major source of revenue.

| | Four weeks to | | Incr. or decr. | Aggregate for 28 weeks to | | Incr. or decr. |
|---|---------------|---------------|----------------|---------------------------|----------------|-----------------|
| | July 17, 1960 | July 12, 1959 | | July 17, 1960 | July 12, 1959 | |
| Passengers— | | | | | | |
| British Railways | £14,600 | £13,014 | + £1,586 | £77,282 | £70,660 | + £6,622 |
| London Transport— | | | | | | |
| Road passenger services | 4,505 | 4,317 | + 188 | 30,384 | 29,027 | + 1,357 |
| Railways | 1,948 | 1,762 | + 186 | 13,691 | 12,720 | + 971 |
| Provincial & Scottish buses | 5,530 | 5,359 | + 171 | 31,817 | 31,146 | + 671 |
| Ships | 986 | 924 | + 62 | 3,179 | 3,056 | + 123 |
| Total passengers | 27,569 | 25,376 | + 2,193 | 156,353 | 146,609 | + 9,744 |
| Freight, Parcels & Mails— | | | | | | |
| British Railways— | | | | | | |
| Merchandise & livestock | 7,922 | 7,529 | + 393 | 55,214 | 53,398 | + 1,816 |
| Minerals | 3,791 | 3,296 | + 495 | 26,692 | 23,733 | + 2,959 |
| Coal & Coke | 7,360 | 7,722 | - 362 | 59,123 | 61,898 | - 2,775 |
| Parcels, etc., by coaching train | 4,365 | 4,131 | + 234 | 29,715 | 28,594 | + 1,121 |
| *Total freight, British Railways | 23,438 | 22,678 | + 760 | 170,744 | 167,623 | + 3,121 |
| Others† | 4,653 | 4,462 | + 191 | 30,576 | 29,258 | + 1,318 |
| Total freight, parcels & mails | 28,091 | 27,140 | + 951 | 201,320 | 196,881 | + 4,439 |
| Total | 55,660 | 52,516 | + 3,144 | 357,673 | 343,490 | + 14,183 |

*Includes receipts from collection and delivery
†Inland waterways freight, road haulage, and ships

The rise in railway passenger traffic was modest, from £13,014,000 for Period 7 of last year to £14,600,000. Much of this would be seasonal holiday traffic over longer distances for which fares have not been raised. The increase in London Transport Underground receipts, from £1,762,000 to £1,948,000 presumably can be attributed to increases in fares. The rise in L.T.E. bus and coach traffic from £4,317,000 for Period 7 of 1959 to £4,505,000, shows that these services are holding their own in the face of growing use of private road transport. Ships passenger receipts were £986,000, against £924,000 last year. They do not reflect the recent strike affecting services between Great Britain and Ireland, which began after most bookings had been made.

Total traffic receipts of the Commission for Period 7 exceeded last year's figure by only £3,144,000, and for the 28 weeks to July 17, over half the current year, the increase was only £14,183,000.

PERCENTAGE VARIATION 1960 COMPARED WITH 1959

| | Four weeks to | | 28 weeks to |
|--|---------------|-------------|-------------|
| | July 17 | July 17 | |
| British Railways: | | | |
| Passengers | +12.2 | +9.3 | |
| Parcels | +5.7 | +4.0 | |
| Merchandise & Livestock | +5.2 | +3.4 | |
| Minerals | +15.0 | +8.5 | |
| Coal & Coke | -4.7 | -4.5 | |
| Total | +6.2 | +2.4 | |
| Ships (passengers) | +6.7 | +4.1 | |
| British Road Services, Inland Waterways & Ships (cargo) | +4.3 | +4.5 | |
| Road Passenger Transport, Provincial & Scottish | +3.2 | +4.6 | |
| London Transport: | | | |
| Railways | +10.5 | +7.0 | |
| Road Services | +4.3 | +4.7 | |
| Aggregate | +6.0 | +4.4 | |

Divergent Views on Transport

SOLUTIONS of the problems of national transport, varying largely according to their political views, are proposed by Mr. Geoffrey Wilson, M.P. for Truro and Chairman of the Conservative Transport Committee, and Mr. Ernest Davies, formerly M.P. for Enfield East and chief spokesman of the Labour Party on transport matters in the House of Commons, in two pamphlets which appeared last week. Entitled "Britain's Transport Crisis" these are the first of a series issued under the auspices of the Road & Rail Association, of which Lord Stonham is Chairman. Neither is an official party document; the sub-titles are respectively "A Conservative's View" and "A Socialist's View." At 2s. 6d. each they afford a valuable indication of the basic problems.

The State, in Mr. Ernest Davies' view, should assume full responsibility for the total capital of the British Transport Commission. In return, it should receive an equity holding. If a working surplus is gained it could be divided on a graduated scale between the State and the B.T.C. The indebtedness of the Commission to the State arising from past deficits and accumulated interest thereon should be waived. He urges a re-examination of the relationship between railway and road transport and an inquiry into the present licensing system for goods transport. Traders who seek "C"-licences, he believed, should need the same requirements as the haulier, and have to prove a need for their vehicles. Larger vehicles and those operating over longer distances should bear heavier taxes to encourage a better use of all transport facilities. The road programme should give priority to the needs of public passenger services, and vehicles used for this purpose should be exempt from the fuel tax.

The relationship of the several forms of transport, he maintains, should ensure that all work is on a basis of equality, and that finances in the public sector should be put in order so that "the B.T.C. can operate" in the expectation of meeting its obligations and fulfilling the functions assigned to it, and consequently be entitled to be left free from external political interference. Solutions based on political doctrine, he rightly points out, have failed.

The investment requirements of transport, according to Mr. Geoffrey Wilson, have been consistently under-estimated. Whilst "a reasonable co-ordination" between plans for railways and roads is needed, full-scale direction of intending users to specified modes of transport is rejected. "We want freedom to travel as and when we please" he states, "but we expect there to be public services which we can use when we don't want to use our own vehicles. No master plan could fulfil these conditions."

Only experience can result in a solution, in his view. While encouraging all other forms of transport to play their part, the Government should concentrate on roads and railways to meet most of the community's needs. Instead of a subsidy, the railways should be run as strictly commercial undertakings by Regional Boards with the Government paying in whole or in part the costs of each unprofitable service which it requires to be continued. He does not deal in detail with the concept of "strictly commercial undertakings."

So far as uneconomical public services are deemed necessary in the national interest, Mr. Wilson states the public must be prepared to pay for them as taxpayers, either by direct grants for particular railway or road services or by tax remission to the providers of road services.

LETTERS TO THE EDITOR

(The Editor is not responsible for the opinions of correspondents)

The Waterloo-Hounslow Line

July 27

SIR,—Anyone reading Mr. A. E. Durrant's suggestion, made in his letter in your July 15 issue, that we are not competitive enough in the frequency and prices of our train service between Chiswick and Waterloo, would think that we are letting a fortune slip through our fingers.

Whatever theories Mr. Durrant might have on the matter, a searching fact-finding survey last year into the traffic on the Hounslow loop line revealed, first, that very few of the present trains are heavily loaded anyway, and, second, that an increase in the frequency of the service would be uneconomic.

The reason seems to be fairly simple: a number of people now using the buses do so mainly because they find the bus routes more convenient, so even a train every five minutes would not help them.

As for price, there appears to be very little in it. Your readers were probably puzzled, as I was at first, because Mr. Durrant compared the present 1s. 11d. single fare with the three-year-old 2s. 1d. return fare. But they will see that if he had quoted the three-year-old single fare, 1s. 5d., and the present return fare, which is only 3s., he would have completely spoiled his argument.

Yours faithfully,

F. D. Y. FAULKNER
Public Relations Officer

Southern Region, British Railways,
Waterloo Station, S.E.1

Friction-controlled Suspension for Bogies

July 22

SIR,—I refer to the article "Friction-Controlled Suspension for Wagon Bogies" in your May 13 issue. In this it is stated that "the full-width spring-loaded thrust faces of the friction shoes also ensure that the two side frames remain square with the bolster."

A comparison of the magnitude of the small squaring couple, which can be exerted through the friction shoes (or snubbers) by the light snubber springs, with that of the large un-squaring couple, which can be exerted under certain conditions by the wheel sets, will reveal that the tendency of the snubbers to hold the assembly square is negligible. In fact the geometry of the bogie is determined at any instant almost wholly by such bias as is generated in the wheel sets by track conditions, moderated by the effectiveness of such tread coning as may exist on the wheels.

This can be demonstrated by fitting bogies of this type with cylindrical-tread wheels and running the wagon on a curve. The bogie, brought to a stop before it clears the curve, will be found to have fore and aft wheel rims substantially out of alignment. This is probably limited only by closure of some assembly clearances.

Such small nominal squaring couple as is derived from the snubbers is likely to be much less effective at high speed than when moving very slowly. The reason is that with a squaring couple exerted by the wheel sets, vertical oscillation of the load springs would cause the wedge-shaped snubber to move more readily to compress its springs than it would to release them. In other words, when there is track vibration, the capacity of the snubber spring to exert a squaring couple would cease to be augmented by the friction of the wedge on its sloping seating, and the two-snubber wedges would more readily move apart, *i.e.*, give way to the out-of-square tendency of the bolster.

It seems likely that the appeal of this type of bogie lies more in its cheapness and light weight than in its functional excellence. The latter must be in some doubt as long as there is no certain means of ensuring that the geometry of a curving bogie remains correct.

Fitted with new coned wheels these non-rigid bogies may enjoy some advantage on tracks with only large radius curves. Conversely, on small-radius curves and/or in the absence of

ideal coning, the axles, in directing themselves more sharply toward the guiding rail, could be expected to derail more quickly (if not more readily) in conditions which favour derailment.

In addition there is the question of greater flange wear in the unsquared bogie. There is ample evidence indicating such wearing conditions, during the above-mentioned curve experiment, in the form of grinding and shuddering noises coming from the slowly moving leading wheel set in the out-of-square bogie.

It is therefore suggested that a somewhat critical view of these bogies is warranted, despite the fact that many are in use, with considerable advantage derived in addition from the friction device.

Yours faithfully,

S. HUNGERFORD

9, Idolwood Street, Eastern Heights,
Ipswich, Queensland

The New Diesel-Electric Pullman Trains

July 27

SIR,—British Railways has received so many brickbats recently that one hesitates to take it to task for its proudest achievement to date, the new Pullman trains. The lavishness with which capital expenditure has been poured on these new services well beyond need cannot but cause grave disquiet to anybody concerned with the railways' solvency.

You have already mentioned in your columns that the ton/passenger ratio in the two six-car L.M. Region sets exceeds even that of the most lavish T.E.E. sets on the Continent, which drives up the operating costs of these sets. Electric transmissions also seem unnecessarily expensive in trains of this type, when hydraulic transmissions, which are already standard in the Western Region, might have served the purpose equally well.

All this is chicken-feed, however, compared with the extravagance of building two six-car trains for the "Midland Pullman" when only one is required on active service, and three eight-car trains for the Western Region when only two will be required to maintain the Paddington to Birmingham and Bristol Pullman services.

I am well aware of the need to take trains like these out of service occasionally for inspection and maintenance, but one day a week should be adequate for the purpose. As the new Pullman services only run from Mondays to Fridays, there would seem to be ample time for repair and maintenance work to be carried out at weekends without having to provide spare sets.

The five Dutch-Swiss T.E.E. sets which operate the "Edelweiss," "Etoile du Nord" and "Oiseau Bleu" services are inspected on one day in every five and are only out of service on that day. Compare this with the six-car Midland Pullman sets which will be out of service for nine days in every 14, and the eight-car Western Region Pullman sets which will be out of service for 11 days in every 21.

Admittedly, unforeseen breakdowns occur even with the best equipment, but after all the running in that the new Pullman sets have enjoyed before being put in revenue-earning service one would expect such emergencies to be sufficiently rare for it to be unnecessary to maintain highly expensive brand-new sets in reserve for the occasion. Fully-amortised Pullman equipment built before the last war would have done equally well.

If such extravagance in capital expenditure is typical of the modernisation programme as a whole, then there may be some justification for "political" interference by the taxpayers' representatives in the affairs of the British Transport Commission.

Yours faithfully,

F. E. LAMOND

29, Oakwood Road,
Bricket Wood, St. Albans

THE SCRAP HEAP

London Military Railway (1860)

The most effective and economical line of defence which London could possess would be a circular railway, forming a complete cordon round it at an average distance of 15 miles from its centre; and having for its interior lines of operation the numerous railways which already intersect the space indicated, and which would form radii and chords to the proposed circle. During war such a railway, with its electric telegraph, would permit of an overwhelming number of men and guns being concentrated at any given point in an incredibly short space of time . . . It would only be necessary to carry a parapet along the entire length of its outer edge, to have numerous "sidings" and "switchings" at regular distances—to have Armstrong and Whitworth ordnance upon large iron-plated trucks.—*From a letter to "The Times" of July 16, 1860, from "A Staff Officer."*

"Sud Express," Steam and Electric

A contrast in operation of the "Sud Express" is shown in the illustrations sent us by a correspondent. The express for many years has been operated as a day train between Paris and the Spanish frontier and break-of-gauge stations of Hendaye/Irun, connecting there with the night "Sud Express" to and from Madrid and Lisbon. The left-hand picture shows the express at St. Pierre-des-Corps, the junction for Tours, in August, 1931, hauled by a Pacific of the former Paris-Orleans Railway. At that time the French train was composed exclusively of baggage and Pullman cars of the Cie. Internationale des Wagons-Lits. It was worked between Paris Quai d'Orsay and Bordeaux by the P.O. and beyond Bordeaux by the Midi Railway, and was electrically hauled for much of its journey. The photograph reproduced on the right was taken in recent years. The "Sud Express" is now

electrically hauled throughout by the South-Western Region of the French National Railways between Paris and the frontier. It consists of S.N.C.F. baggage and first class corridor coaches and Wagons-Lits Company restaurant and Pullman cars. The schedule for the 365 miles from Paris is 4 hr. 43 min. non-stop. The Paris terminus is the Gare d'Austerlitz, because S.W. Region main-line trains today are too long for the platforms at the Quai d'Orsay, to which the line is extended in tunnel from Paris Austerlitz.

"Apes are Apes"

A chimpanzee consigned to a circus escaped from its basket in a Kings Cross to Newcastle express. It scampered down the train and threw its arms round a passenger. At York, in the North Eastern Region, it was taken in charge by Mr. H. Taylor, the Parcels Foreman. It jumped into his arms and cried every time he tried to put it down. The ape remained in the care of the York Parcels Office staff for some hours.

Changes at Altoona Works

In 1866 the Pennsylvania Railroad turned out the first new locomotive from the works which it had established for locomotive maintenance 16 years earlier at Altoona, Pa. By 1926, Altoona Works had become one of the biggest locomotive-building works in the world, and the Pennsylvania was almost alone among U.S.A. railways in building all its own locomotives. With the help of its locomotive testing plant, one of the earliest in the world, Altoona turned out some notable designs, in particular the "K4s" type Pacific, which for many years was the mainstay of the Pennsylvania passenger services. The war of 1941-45 saw a rapid decline in production at Altoona, and the "T1" 4-4-4-4 and "Q2" 4-4-6-4 duplex-drive steam locomotives, were the last steam types built

there. Steam locomotive repairs have now been reduced almost to nil. The surplus works property is now to be turned over to other uses.

Discipline for Railwaymen

Reply of General Saleh Zaki Tawfiq, Director-General of Iraqi Railways, to criticisms of allegedly indiscriminate dismissals of inefficient staff: "I come from a family of soldiers dating back for several hundred years. The spirit of military discipline and rigidity has become part of my blood. I am one of those who have faith in the deterrent effect of stern penalties."—"Peterborough" in *"The Daily Telegraph."*

Followed with Difficulty

Mr. William Hannan (Glasgow, Maryhill): The hon. Member for Cleveland (Mr. Proudfoot) will appreciate that I do not intend to follow him in whatever it was that he was trying to say because, frankly, I could not follow him. My only comment is that Sir John Elliot, a former President of the N.U.R., who has probably forgotten a good deal more about transport than any of us will ever know. . . .—*Hansard, July 28, 1960.*

[Including this exalted connection with the N.U.R. ?—Ed., R.G.]

"Hawkes Rules" Enforced

When travelling in Italy
I had Hawkes Rules applied to me.
Reluctant to pay first class prices,
Unwittingly I caused a crisis:
The guard was shocked, and, strange to say,

Declared it "Non possibile!"
With deference, but firm insistence,
He overcame my weak resistance,
And ushered me from wooden slats
To cushioned ease and sumptuous mats;
But best of all, all this was free—
No excess fare was charged to me.

M.S.M.



[Photos]

"Sud Express" at St. Pierre-des-Corps in 1931, hauled by 4-6-2 engine of Paris-Orleans Railway



[F. S. Middleton

Departure from Paris Austerlitz with 2-D-2 electric locomotive

OVERSEAS RAILWAY AFFAIRS

(From our correspondents)

SOUTH AFRICA

New Motive Power and Rolling Stock

Sixteen new electric and 13 diesel-electric locomotives were placed in service during the first quarter of this year. In addition, 51 passenger vehicles, built by the Union Carriage & Wagon Company in South Africa were added to the South African Railways fleet. During the same period, 1,671 goods wagons of various descriptions and 10 guards' vans were placed in service.

NEW ZEALAND

New Station at Christchurch

A new railway station at Christchurch will be officially opened in October, 24 years after it was originally designed and 11 months ahead of the eventual contract time. The building replaces what is believed to be the oldest railway station in the Dominion. The new station has cost £800,000. It is 530 ft. long, includes 80,000 sq. ft. of floor space, and is surmounted by a 110-ft. clocktower.

CANADA

C.N.R. Road Transport Expansion

Canadian National Transportation Limited, the road haulage subsidiary of the Canadian National Railways, has completed stock purchase agreements with four road haulage concerns which will extend its road services over an additional 15,000 route-miles in seven provinces of the Dominion. Mr. N. J. MacMillan, Executive Vice-President, has stated that this acquisition is the culmination of more than two years of planning

for the development of a "programme to establish a first class co-ordinated system of land transport throughout Canada." He added: "Basically we regard the truck as the best instrument for retailing transportation services, and the railway for wholesaling."

Canadian National Transportation Limited, is to be operated as a completely separate entity. Similarly, the undertakings acquired will continue to be operated as separate entities. The C.N.R. management believes that its objectives can be attained largely by acquiring existing road transport organisations. It avoids attempting a sudden addition to the total transport facilities of the country, which might tend to produce an undesirable surplus of transport.

ARGENTINA

Closure of Branches

It has been decided to lift a total of 3,000 miles of track corresponding to non-productive branches, a start being made immediately. Some 20 miles of track is being removed in Tucumán, as part of the remodelling of railway access to the city.

General Roca Railway Accidents

Very considerable damage was done as a result of two accidents on the General Roca Railway in June. A total of 150,000,000 pesos was lost on June 23 when two petroleum trains collided violently at Río Colorado in the Province of Río Negro. The locomotives and tank wagons of both trains were a complete loss, flames reaching a height of 150 ft., and threatening to spread to nearby buildings.

A broken axle was the cause of a derailment of a goods train at Ombueta.

Twenty-one wagons loaded with grain were overturned, their contents lost, severe damage being suffered by both rolling stock and track. The magnitude of the accident made it necessary to build a provisional by-pass in order not to interrupt completely the services to and from Bariloche.

Mitre Railway Wagon Repairs Contract

The repair and reconditioning of wagons of the General Mitre Railway will in future be undertaken by the firm of Los Cardos S.A. which has set up a plant at Los Cardos, Province of Santa Fé.

LEBANON

Sleeping Car Service Extended

The seasonal through sleeping car from Haydarpasa to Tripoli, which was re-introduced in 1959 after a break of almost 10 years, has been extended to Beirut over the line built for military purposes during the war. The through service will run twice weekly until the end of October.

WESTERN GERMANY

Electrification Progress

Electrification of the main line down the right bank of the Rhine from Frankfurt to Cologne via Wiesbaden, is due for completion by introduction of the 1962 summer timetable.

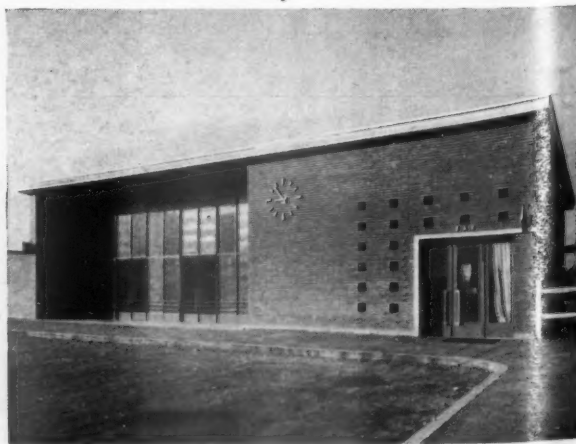
New Goods Wagons

Nearly 5,000 goods wagons were purchased by the Federal Railway in 1959. Most of these are for special traffics. Some four-wheel wagons are of 28 tons, and some bogie wagons of 57

S.N.C.F. Station Architecture in Normandy



Glos-Montfort, re-built after the war in adapted Norman domestic style, on the Rouen to Serquigny line



Contemporary style of Serquigny Station, on the Paris-Cherbourg main line of the Western Region

tons, capacity. Nearly all the new wagons can run at 62 m.p.h. The Federal Railway wagon fleet includes 268,000 vehicles owned by the railway and 40,000 privately owned.

Platform Barriers

Roughly half the passenger stations of the Federal Railway no longer have platform barriers. A recent public opinion poll showed that 53 per cent of passengers approved of barriers (largely, it is presumed, because they could obtain, at the barrier, information and confirmation as to boarding the right train, and so on) and that 38 per cent wished them to be abolished. The Federal Railway management accordingly has abandoned plans for general elimination of barriers.

DENMARK

Growth of Ferry Traffic

The traffic on the Danish State Railways ferry routes is growing rapidly. In the year ended March 31, 1960, the 25 ferryboats and other ships made about 48,700 round trips. On the two Great Belt crossings between Korsør and Helsingør (16 miles) and between Helsingør and Knudshoved (12 miles) about 50 round trips were made each day, and the traffic amounted to 5,760,000 passengers, 38,000 railway passenger vehicles and

vans, 393,000 goods wagons, and 961,000 motorcars. The last figure shows an increase of 85,000 against last year. Also on the short Elsinore-Helsingør ferry route, there was heavy traffic with 4,063,000 passengers and 300,000 motorcars.

SWEDEN

Diesel-Electric Shunting Locomotive

The largest diesel-electric shunting locomotive to operate on Swedish railways was recently delivered to T.G.O.J., the railway company belonging to the Grängesberg Group. It is the first unit in a series of five and has been built by Svenska Järnvägsverkstäderna, Falun. The electrical equipment has been supplied by Asea. The locomotive weighs 61 tons, has an engine output of 800 h.p. and a top speed of 31 m.p.h. The locomotive is primarily to be used at Oxelösund, the Grängesberg Company's steel-making centre and ore-shipping port.

U.S.S.R.

Accelerated Leningrad-Moscow Service

The diesel-hauled afternoon expresses between Leningrad and Moscow, first introduced two years ago, have been accelerated to complete the 404-mile journey in only 6 hr. 20 min. The south-

bound train leaves Leningrad at 3.55 p.m. and reaches Moscow at 10.15 p.m. Northbound times are 15 min. earlier throughout. These are the fastest runs ever scheduled between the two cities. A 10-min. stop at Bologoe is scheduled in each direction.

Two-Berth Sleeping Cars

The new European-type sleeping cars with two-berth compartments, used on the Paris-Moscow and Hook of Holland-Moscow services, have also replaced the four-berth type of cars formerly used on the services Berlin-Moscow, Vienna-Moscow, Belgrade-Budapest-Moscow and Prague-Warsaw-Moscow. The new cars have been supplied by Waggonfabrik Görlitz, Eastern Germany.

AUSTRIA

Lofty Bridge Over Drave

Work in progress on the 12-mile Jauntal line, which will connect Klagenfurt with the valley of the Lavant, includes a girder bridge over the Drave, some 1,400 ft. long and 300 ft. above water level. The bridge will carry a single rail track and a public footway 5 ft. wide. Several steel bridges on the Federal Railways are due for replacement in the next few years. They include the Trisanna Viaduct on the Arlberg main line.

Publications Received

The Locomotives of the London Chatham & Dover Railway. By D. L. Bradley. The Railway Correspondence & Travel Society, 19, Dene Court, Olton, Solihull, Warks. 8 in. x 6 in. 48 pp. Paper covers. Illustrated. Price 13s. 6d. post free.—Completion in 1959 of electrification of nearly all the lines in British Railways, Southern Region, of the former London Chatham & Dover Railway, and scrapping of locomotives over the past 40 years have resulted in the disappearance of virtually all L.C.D.R. locomotives, if the last has not already been broken up. The troubled history of the motive power of the railway in its 40-odd years of independent existence, when chronic shortage of funds necessitated economy at all times, repeated rebuilding, improvisation and re-use of worn materials, is dealt with comprehensively.

Civil Engineering Today. By Rolt Hammond. London: Oxford University Press, Amen House, Warwick Square, E.C.4. 8½ in. x 5½ in. 229 pp. Illustrated. Price 21s.—Despite its moderate size this book has a remarkably wide scope ingeniously condensed. It deals with all kinds of recent civil engineering constructional work. Such subjects as soils and foundations, tunnelling, bridge-work, harbours, dams and canals, and highways are clearly discussed mainly with the aid of detailed descriptions of typical modern examples. A 20-page chapter is entitled "Problems of Railway Civil Engineering." After sketching the

evolution of permanent way, the author enlarges on long-welded track, prefabricated laying and mechanical maintenance. Formation generally, specific cutting slips and their stabilisation, as well as blanketing and drainage all find places in this chapter. So also do defects and remedies in Bo-peep (St. Leonards) and other tunnels, and the designs and construction of many historical tunnels and bridges are recalled. A final chapter on the lessons learnt from engineering failures is unusually valuable. The book is well produced and illustrated, and is fully in keeping with the other good works by the same author.

La Traction a Moteurs Thermiques. By Marcel Chatel. Paris, 5e: Editions Leon Eyrolles, 61, Boulevard Saint-Germain. 10 in. x 6½ in. x 1 in. 440. pp. Paper covers. Price 51.80 NF.—This is a basic work on diesel locomotives written by one of the best-known French railway engineers of the last half century. No attempt is made to deal with makes of equipment or different proprietary systems, except in a fundamental way as they are governed by principles. But the material is in no way confined merely to engine equipment, transmissions, auxiliaries and other specialised items, but deals in full also with the general requirements of mechanical portions, bogies, superstructures, and the locomotive as a vehicle. There is also a comprehensive study of the problems of traction and the basic operation of diesel locomotives, treated in a semi-mathematical

fashion. The 500-illustrations are almost entirely curves, graphs and sketches of principles or specific calculations, and do not include drawings of actual details or installations. This work would be an excellent text book for a course on diesel locomotives at a technical college or university, in the hands of a professor or lecturer able to draw freely on actual practice and so give the students that practical and commonsense knowledge so much needed today.

Equipment for British Railways New Diesel Pullman Trains.—A 12-page brochure published by J. Stone & Co. (Deptford) Ltd. describes the equipment supplied by that company for the diesel-electric multiple-unit Pullman trains built by the Metropolitan-Cammell Carriage & Wagon Co. Ltd. for the London Midland and Western Regions of British Railways. The equipment described includes auxiliary power supply and distribution gear, complete air-conditioning and lighting installations, inter-coach electric couplings, speedometers and distance counters, and the track speed controls used in conjunction with special train braking. Illustrations include layout drawings which aid the location and identification of Stone equipment in typical cars of the Pullman trains. Also there are diagrams of the complete six- and eight-car trains accompanied by lists summarising all components and indicating the cars in which they are installed. Copies may be obtained from J. Stone & Co. (Deptford) Ltd., Arklow Road, London, S.E.14.

The Specialised Carrier

Specialised wagon development designed to meet individual requirement brings in more business, including a greater range of bulk conveyance

By A. H. Moncrieffe,
Assistant to Commercial Officer, Sales

TRANSPORT is a vital link in the chain of production and for the carrier to provide an efficient and satisfactory service it is essential that he should keep abreast of industrial and commercial development and be in a position to meet its ever-changing needs.

Before the invention of the internal combustion engine railways were the only means of transport on a national scale. From their inception they were organised as common carriers conveying almost anything to any part of the country. In doing this comprehensive job they acquired a unique background of experience.

Specialisation

Expanding trade, growing concentrations of industry, the supply of large centres of population, and the drive for increased productivity have led transport inexorably in the direction of specialisation.

The strides made in the field of specialised transport are quite remarkable. A pointer is the rapid growth over the last few years of "C" licence road transport, which, apart from other considerations, is really nothing more than the trader meeting his own special transport needs.

Side by side with the paramount task of providing a modern national rail system, British Railways has devoted substantial technical and financial resources to the development of specialised carrying. The wide variety and number of special types of wagons, containers, and equipment now in operation is evidence of its foresight and imagination in this branch of transport.

Specialised carrying is a scientific, technical and economic study of an

individual requirement, whether for the producer and/or consumer, or for the characteristics of a particular commodity. The research work carried on by British Railways in this sphere is extensive and continuous. As requirements clarify, new and improved designs are incorporated with building programmes and pushed forward with the utmost vigour.

Central control of policy, research, and the building of rolling-stock and equipment is necessary to an organisation of the size and scope of British Railways. This is in no way a restriction on the Regions, in the initiation and development of schemes to suit the industries and traffics in which they are geographically concerned. The North Eastern Region takes full advantage of this freedom of action and, in close co-operation with the industries it serves, has made and is making a notable and worthy contribution to the success of railways as specialised carriers.

Bulk Transport

With increasing momentum, industry is turning toward the bulk movement of materials and merchandise. Until comparatively recently, bulk carrying was confined to a few basic raw materials—coal, iron ore, limestone, and oils—for which our general bulk-carrying wagons are eminently suited. The range of traffics moved in bulk today is quite astonishing, including as it does cement, chemicals and solvents, pulverised fuels, feeding stuffs, grain, fertilisers, salt, sugar, beer, milk, cider, and clothes.

An outstanding example of specialised bulk transport in the North Eastern Region is the 56-ton capacity iron ore

wagons supplied for the Consett Iron Co. Ltd. for use between Tyne Dock and the company's works at Consett. These high-capacity wagons are filled under the storage hoppers at the dock, where a train of nine wagons is loaded in less than a minute with 500 tons of iron ore. The wagons are self-discharging through pneumatically-operated side-doors and the whole train is emptied with equal speed in one operation.

Presflo Wagon

The large-scale requirements of cement for building projects like road construction, and power stations, housing and factory rebuilding and development, were largely instrumental in bringing about the change to bulk movement from the industry's traditional packaging medium, the paper sack. In conjunction with the cement industry, British Railways designed and introduced the Presflo wagon, a vehicle which will carry 20 tons of cement and discharge it pneumatically.

The first prototypes of this highly successful wagon were built at the North Eastern Carriage & Wagon Shops at Shildon and the Region was closely concerned with the experimental stages of development. Cement originating in the Region at Hull, Ferriby, and Haverton Hill is forwarded to large regular receiving areas at Tyneside, and in North Lancashire and the West Riding.

A few months ago, the Region introduced the first throughout bulk-delivery service on British Railways, thus completing the chain of door-to-door movement of the traffic. Two special bulk-delivery road motor units are operating in the Leeds area, where they are providing a site delivery service for some 1,300 tons of cement each month. The success of this venture foreshadows the provision of delivery units at other regular receiving centres and also road vehicles with greater flexibility to enable a throughout service for large contracts wherever they arise.

Pulverised Fuel Traffic

Increasing use of the Presflo wagon is also being made to convey pulverised fuel from Brancepeth and Grimethorpe to Tonbridge and Coatbridge.

The wagon is used for other bulk traffics capable of discharge by air pressure such as salt, alumina, and basic slag. Despite its undoubted success in specialised carrying, it has its limitations and the Research Department of British Railways has completed tests with a prototype of a new twin-silo wagon designed to convey and unload pneumatically a much wider range of materials in bulk.

To assist the introduction of mechan-



Presflo wagon and bulk road delivery unit at Leeds Marsh Lane

ical handling appliances for a regular inter-works movement of heavy coils of wire rods at a large Tees-side steel works, the Region specially adapted a number of bogie bolster wagons which enable fork lift trucks to operate on the rail wagon floors.

Timber Wagon

Another interesting development of specialised carrying in the Region is the timber wagon. It will carry a payload of four standards, about 10 tons, and is designed for mechanical loading and discharge. This vehicle is probably in advance of the universal requirements of the timber trade because of the comparatively small number of timber merchants who are equipped with up-to-date handling devices capable of taking full advantage of its design. It is an outstanding demonstration of the desire of the North Eastern Region to develop and extend its specialised carrying services.

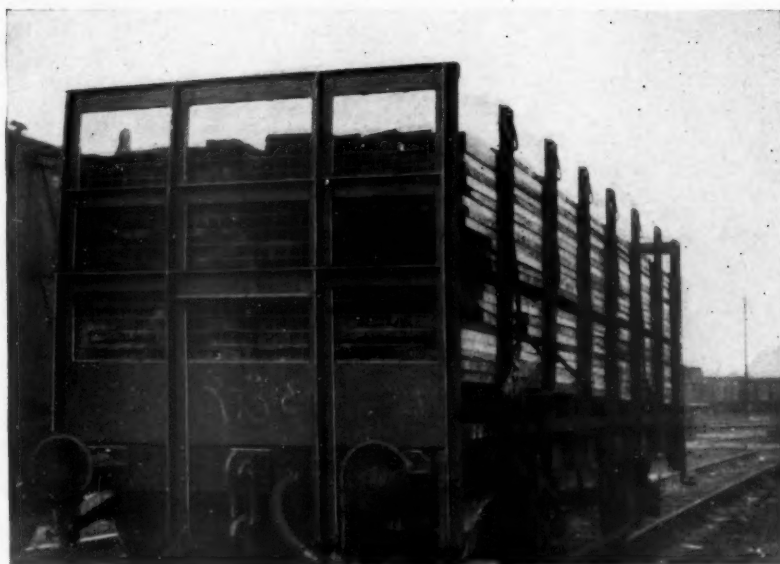
In recent years there has been a big growth in the palletisation of traffic. To meet this modern method of carrying loads on pallets or stillages the railways introduced special wide-door pallet vans and wagons. They are employed in traffics of uniform dimensions where safety, speed, and economy in handling is essential, but as diverse in character as chocolate and bricks. One large chocolate manufacturer in the Region has 300 of these pallet vans in daily service to depots in all parts of the country, and 150 palbrick wagons serve the requirements of several important manufacturers of refractory bricks in Durham and in Yorkshire, despatching to power stations and steelworks.

I have mentioned but a few of the more modern special vehicles which the Region has played a prominent part in developing. Our geographical and commercial interest in the steel and engineering industry of the north-east coast gives us a stake in the development of the vast number and variety of wagons, which have been specially designed and introduced by the railways over a long period and are now in universal use. Frequent use is also made of the highly-specialised vehicles in the movement of steel and engineering pieces of exceptional dimensions and weight.

Greatly-increased Traffic

The increasing use of petrol and fuel oils, the demand of industry for the by-products of coal and oil, and the greater use of chemicals in the manufacture of plastics, are the stimulus behind the phenomenal progress of bulk liquid transport.

More than six million tons of liquid in bulk are carried by rail each year, and this is growing in volume. While oil products naturally form the largest group, there are chemicals, solvents, fruit juices, tar, molasses, latex, caustic soda, milk, cider, and beer. There remains a tremendous potential in bulk liquids which calls for a bold and imaginative policy to secure it firmly to rail. Substantial capital investment is being undertaken by British Railways, and certain sections of private industry, in modernising and increasing tank wagon fleets,



Prototype timber wagon

but much more remains to be done.

The railways hold many advantages in the movement of liquids and, confident of their ability to provide a service attractive to industry, the Region has recently appointed a specialist to its sales staff to concentrate on the development of bulk liquid traffics.

Container Services

An entirely different branch of specialisation in which British Railways have excelled are the container services. Over 50,000 containers, comprising 18 different types, are in service today. Types vary from what is virtually an open box to a highly-insulated container for ice cream and quick frozen foods; from the BC with a capacity of 735 cu. ft. to the popular SW (small-wheel) of 70 cu. ft., which can be pushed round easily by hand.

Over 500 of these small mobile containers are in service from North Eastern Region stations, principally carrying ready-made clothing, piece goods, and engineering and electrical components. The elimination of protective packing and ease of handling are the economic features which make this container so attractive to manufacturers.

There are many instances where special fittings have been installed in containers to meet the needs of particular traffics, and the Region has pioneered several interesting schemes of this kind. One of the most recent, and perhaps the most successful, is the adaptation of BD containers with fittings to carry motor carpeting from a Heckmondwike concern to principal motor car manufacturers in the Midlands and London area.

Adapted Containers

Beginning some 18 months ago with one internally-fitted container, the Region has now adapted and put into service 17 of these special units, and there is every indication that many more will be required to meet the needs of the rapidly expanding motor industry.

Perambulators are also catered for in

this way. The containers are painted in the trade colours of the West Riding company concerned to provide publicity for the customer.

The ready-made clothing industry in the West Riding has virtually a wardrobe service. Specially-fitted containers enable the safe and speedy movement of garments on hangers direct from some of the larger manufacturers to the wholesale and retailing houses in different parts of the country.

The "L"-type container has proved an ideal medium for site delivery or discharge to lorry or tipping vehicle of bulk materials of all kinds. The number of these containers in use on British Railways—over 5,000—is proof of their practical use. Large tonnages of dolomite and limestone are despatched from quarries to steel works within the Region by this form of specialised carrying.

Light Materials and Plastics

The latest thought in rail-road container construction is toward reduction in tare weight by the use of light alloys and plastics.

Several experimental designs are being tested by British Railways and in the past few months the North Eastern Region has been carrying out trials with a prototype glass fibre/Polyester plastic container which was designed and manufactured privately in the Region.

Moulded in one piece, apart from the doors, the P.1 container is corrugated where principal stresses occur to give greater rigidity, and the novel material used in its construction is reputed to be one of the strongest and most stable available.

The main advantage compared with conventional types of containers is in the exceptionally low tare weight ratio to carrying capacity which is a valuable feature in conserving road motor and crane capacity.

Half the weight of the conventional "A" type, the container can carry five tons as against four tons and is capable of modification for handling by



Removable fittings for the conveyance of clothing

fork-lift truck. It can be stacked, thus economising in storage space.

In this article space permits mention only of the more interesting schemes of

specialised carrying by rail in which the Region has been intimately concerned. If a complete picture were possible of British Railways as a whole, many more

notable developments could be described involving many types of wagons, containers, and equipment.

Not only does specialised carrying entail the supply of special types of vehicles. We find in increasing measure that terminal problems of loading, discharge, supply, and production require to be fitted efficiently and economically into an overall transport presentation.

To maintain the essential contacts with industry to facilitate this wider specialised service, the Region has strengthened its District sales organisations with high-level staff with the experience and ability to concern itself with comprehensive proposals of this order. Specialist salesmen have also been appointed to develop the traffic in conveyance of liquids and solids.

The measures described in this article provide sufficient evidence of the ability of the railways to provide first-class specialist services to meet any need. The complete development of these services is closely linked with the fulfilment of the Modernisation Plan.

The railways have the scientific and technical resources to keep them in the forefront of specialised carrying and the North Eastern Region is confident that its commercial outlook is equally well founded.

Freight Rate-making in the North Eastern Region

Reorganisation of headquarters rates office and establishment of area rates sections; appointment of specialist "rates consultants"

By J. Blackstock

Freight Charges Assistant to Commercial Officer, N.E. Region

UNTIL 1959, rate-making in the North Eastern Region was centred at York headquarters and followed traditional lines.

Although the Region did not experience the problems encountered in less compact territories, changing conditions demonstrated the need for still greater speed in quotation against yet growing competition. This was the situation despite the fact that, since 1931, special rates telephone circuits had provided rapid service between headquarters at York and traders, district offices, and stations, as well as giving excellent facilities for inter-railway consultation.

Competition in the industrial field and in transport itself emphasised the need for local decision in providing up-to-the-minute quotations, especially under the increasing impact of the sales drive.

Decentralisation

It was in these circumstances that it was decided to provide a system of decentralisation of rate-making in the interests both of the Region and its customers.

As part of the Regional pattern, Traffic Managers had already been appointed in the Humber and York (Hull), Tees-

side (Middlesbrough), Tyne & Wear (Newcastle), and West Riding (Leeds) areas, each with its own particular concentration of traffics—shipping business, animal feeding stuffs, and oils on the Humber; iron and steel and chemicals on Tees-side; shipbuilding and engineering on the Tyne and Wear; machinery, wool, and textiles in the West Riding.

Gradual Changes

It was clear that any step toward the devolution of authority for rate-making would need to take these facts into account. Furthermore, the change would have to be gradual so that staff could be selected and trained in the traffic areas, and an organisation built up.

The change was made in two stages. As a first step, it was decided to retain full authority at headquarters for rates concerning certain national (and thus more important) traffics and traders. The Traffic Managers were granted complete autonomy regarding the rest.

Once the arrangements had settled down and proved themselves, the second step was taken. Broadly, this involved no more than a reduction in the traffics and traders negotiated with by headquarters, and as a corollary an extension

of the Traffic Managers' authority.

The changes involved the reorganisation of the headquarters rates office and the establishment of area rates sections. Headquarters personnel was adjusted to take account of the work transferred to the district offices. At the same time, the central organisation was streamlined by the introduction of a greater degree of specialisation, responsibility, and supervision within the rates office.

In the traffic areas, rates staffs, attached directly to the commercial district offices, were set up at a suitable level. A specialist "rates consultant" was appointed in charge of each district—a senior official who was made responsible to the District Commercial Officer for all rates work.

Headquarters Training

The consultants were trained at headquarters, studying not only their own particular problems, but also those involved in head office control—not only the reserved traffics but also matters relating to inter-Regional, coastwise, etc., consultation. This training has proved invaluable in ensuring maximum co-operation between the district and the centre.

The arrangements have worked

smoothly. There is close collaboration; headquarters and district staffs consult regularly on day-to-day matters, and there are frequent discussions between the senior control staff and the rates consultants to ensure unity of policy and practice, and to thrash out problems.

Devolution has gone far toward cutting-out irritating and frustrating delays in rate-quoting. It is apparent that there are great advantages in making direct use of the local knowledge of the man on the spot; traders appreciate being able to deal at first hand with him.

In all this, there is a complete tie-up with the Traffic Costing Service whose help has been unstinted, not only in the general field but also on specific matters of individual flows.

Constant Review

The measures already described are by no means the end; the experiment is under constant review. It is early yet to forecast the lines of future progress, for much depends on the trends of administration as a whole. At this stage the indications are that most day-to-day rates work will be done in future by the district rates staffs; headquarters will confine itself to matters of policy and overall negotiations with a limited number of firms and organisations. Events may well show that Goods Agents at the more important stations should possibly be given some authority in the field of spot lot business.

It is becoming clear that, as the railways fulfil their part in the transport complex, the rate-maker will come more and more to the forefront.

Selection and training of staff thus becomes all important. The North Eastern Region faces the fact that staff training and education on a wide scale is vital, and that this can only be achieved by planned and persistent efforts.

The opportunity was taken when the

British Transport Commission (Railway Merchandise) Charges Scheme 1957 was introduced to hold short but intensive courses throughout the Region. These were attended by some 900 charging and accounts clerks, stationmasters, goods agents, and district office rates, sales, development, and accounts staff.

Extensive Training

The courses covered not only the charges scheme as such but also the problems, techniques, and importance of rates work generally. The subject is included, too, in the syllabus of evening commercial courses and residential clerical courses.

Rates problems are given a prominent place on the agenda at District Officers' meetings with stationmasters and goods agents. Every encouragement is given today to exchanges of view between the rates, sales, and development staffs to ensure the maximum effort from these inter-dependent commercial interests.

Plans are taking shape for a further series of courses designed to bring home to station and district office staffs concerned with charging or rating the special problems and needs of the present day.

No less attention has been given to the problem of selection. Over the years, rate-making has tended to be regarded as a specialist job. The old methods, regulations, and obligations made it difficult for a man to cope with even everyday work without an extensive background of training and experience.

Promotion from Within

It was inevitable, therefore, that for the most part promotion came from within the department. The rate-maker of those earlier times thus became expert in his own sphere, but the view has been held that in so doing he ignored the general run of railway development, becoming narrow and inflexible in outlook. To what extent these allegations were true

is now merely a question of history; in present-day conditions there is certainly no room for any but the broadest outlook.

The North Eastern Region faces the fact that the rate-maker is a front-line salesman, wielding a great influence on railway prosperity. To this end, he is expected to know and believe in the product he has to sell; to appreciate and anticipate the needs of the customer's business, and to assess accurately the strength and effectiveness of competition. In other words he is required to produce the rate for the job.

To find the right type of man the Region has been ready, in its own interests and those of its customers alike, to introduce into the rates staff—including those in the more senior positions—personnel which does not necessarily have a life-long rates experience but whose general and immediate experience and personal qualities match up to the other essential requirements.

Broad Outlook

It was recognised that the movement must be out as well as into the rates office, and to this extent rate-makers are not discouraged from seeking other spheres of railway activity in which to use and improve on their experience.

Nor has it escaped notice that to give of his best a man must have the best equipment. On the introduction of the new charges scheme, the Region took the rates books which were cluttered up with a 30-year accumulation of rates, 90 per cent of which had fallen into disuse, and replaced them by a modern card-index system which has undoubtedly eased the rate-maker's lot. As time and finances permit, new office furniture is being introduced.

In brief, commercial effort in the Region is making an individual and worth-while contribution to the modernisation plan.



Weltrol and Flatrol, each fitted with special traversing bolsters to allow 15-in. lateral movement

The Range and Properties of Translucent Ceilings

Varying types and applications suitable for railway buildings



Even diffusion from a translucent pan-type ceiling

THERE are five main types of illuminated ceiling; the corrugated strip of semi-rigid translucent vinyl diffusing material (Fig. 1), the "pan" or "module" of vinyl or P.V.C. (Fig. 2), the "honeycomb" of styrene (Fig. 3), the sheet of stretched vinyl "skin" (Fig. 4), and the recessed self-contained box-type lighting unit. The last is not really a ceiling. It is generally one of a number of separate units inserted in an otherwise non-luminous ceiling. With the exception of types 3 and 5, the units forming illuminated ceilings are supported in light metal frameworks, as shown in Figs. 1, 2 and 4, suspended from the structural ceiling. The lighting appliances, fluorescent, cold cathode, or even ordinary filament lamps, are installed above the diffusing surface. Daytime rooflight illumination also can be used and artificial lighting substituted at night or when greater intensity is required.

Corrugated Strip

Each of these forms has its individual applications and advantages, and most of them can be used in combinations suitable to particular requirements. The corrugated strip, frequently used in combination with the pan type, is very useful for covering large areas. It is simple, economical, and effective. The pan or module consists of separate trays of diffusing material that can be used either to form an entire ceiling, or sections of it, of various sizes down to the basic unit, which varies from 2 ft. x 2 ft. to 3 ft. x 3 ft.

or 2 ft. x 4 ft., according to the make.

There are certain refinements of this form such as Circlegrid and Paragrid panels manufactured by Harris & Sheldon (Electrical) Limited which because of their perforations do not collect dust particles so easily as panel systems, and therefore require less maintenance.

There are also decorative modifications such as the sort produced by Luminated Ceilings Limited, of which there are four variations consisting of solid pyramidal configurations diversifying the basic module form. The "honeycomb," produced by Harris & Sheldon (Electrical Limited) under the trade name of Luvetile, is a lattice structure of individual

1-ft. square units. It has the advantages of cheapness and ease of maintenance.

The latest development is the panel of vinyl skin stretched tightly across a light metal framework. It is the lightest weight ceiling of all, least expensive, easy to assemble, and useful for covering large areas.

The individual lighting unit should be considered apart. It is not intended to be used as a ceiling *per se*, but as a diffuse

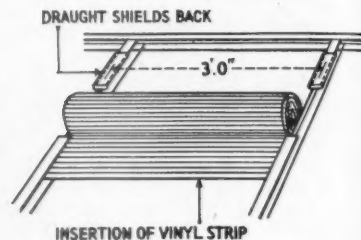


Fig. 1—Installation of a Crompton Parkinson Limited vinyl strip

area of illumination in a conventional suspended ceiling or structural ceiling, as shown in the relevant photograph. In form it is a rectangular box containing the lighting appliance. It has a translucent pan panel through which the light is diffused.

Transmission of Light

The light transmitting properties vary widely according to the type of ceiling, thickness of material, and similar factors. It is clear that a perforated ceiling will allow more light to pass than the average module ceiling. The amount of light transmitted may also vary according to the colours chosen. Most types of diffusing material are obtainable in two or more colours as well as the basic white. For highlighting, spotlight units are available to fit in with all forms of illuminated ceiling.

Installation methods are simple. The first step is to prepare the ceiling cavity. A good reflecting surface is necessary, and the structural ceiling is

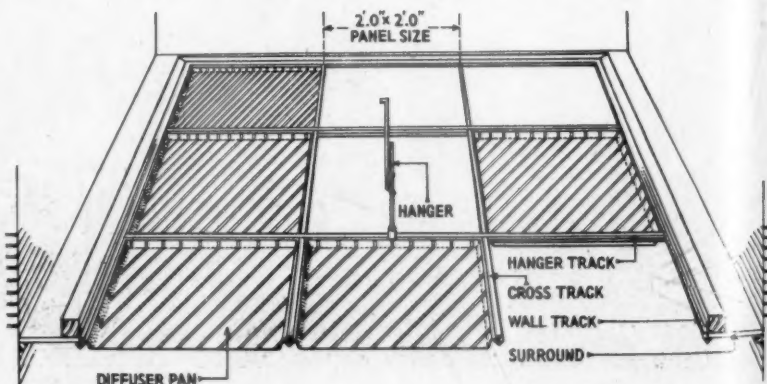


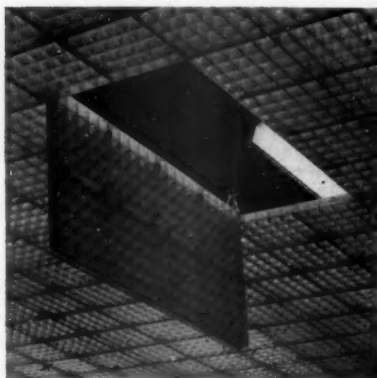
Fig. 2—Structure of a Luminated Ceilings Limited module ceiling

generally treated with a high reflecting quality white paint or with vinyl-coated paper. Obstructions such as pipework are similarly treated.

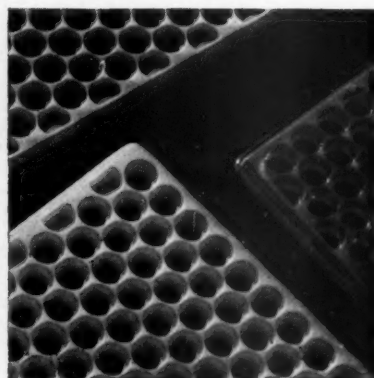
Maintenance

As a rule, maintenance offers few problems. The diffusing mediums in most cases are guaranteed against premature deterioration, and have been used successfully in widely varying conditions and climates. Cleaning is a simple matter and merely consists of removing the pans, strips, or sections and sponging them in a detergent solution. Diffusers can also be periodically dipped in an antistatistical solution which very considerably reduces accumulation of dust.

One of the disadvantages of the corrugated vinyl strip type of ceiling is that it is more difficult to remove for cleaning than other types consisting of smaller units such as the pan or the vinyl skin membrane.



An open trap-door in a Luvetile ceiling



Circular grid units showing perforations

facilitate maintenance, such as the hinge support used with Luvetile (Fig. 3) which allows an assembled block of

makes rely on a basic structure of horizontal rails suspended from the ceiling. The rails have a T, H, or U

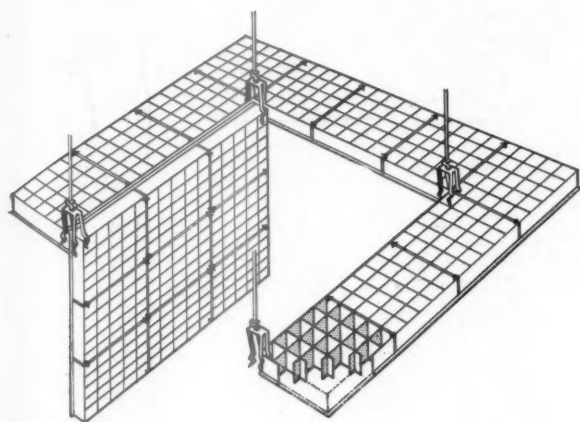


Fig. 3—A Harris & Sheldon Luvetile honeycomb-type fitting with hinged suspension

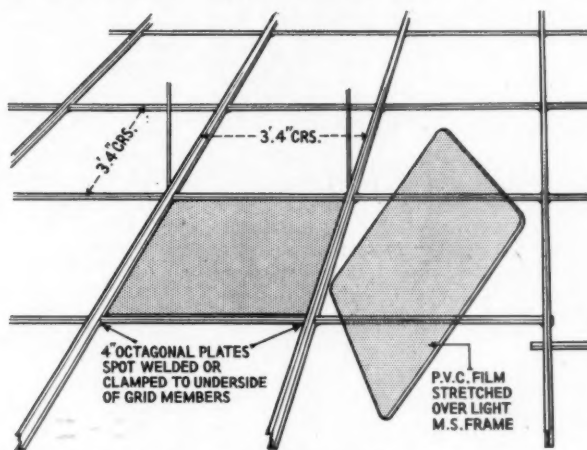


Fig. 4—Tracks for the suspension of a ceiling of P.V.C. skin sheets by Isora Ceilings Limited

The metal framework itself varies in pattern according to the make, and there are some ingenious modifications to

units to be dropped like a trap-door for easy access to the installations above, or removed completely for cleaning. Most

sectional design, the flanges supporting the ceiling units. Screws have been almost entirely eliminated.

Dimensions

The dimensions of the ceiling units are designed to fit flush with the walls of the room. But in cases where ceiling areas are irregular, or do not otherwise conform with the area covered by the intended fittings, the difficulty is easily overcome by horizontal or vertical "furring."

Most manufacturers supply fixtures for the attachment of suitable furring, and some include the furring itself.

The following is a list of manufacturers and suppliers of the products mentioned :

Crompton Parkinson Limited, Crompton House, Aldwych, London, W.C.2; Harris & Sheldon (Electrical) Limited, 46, Great Marlborough Street, London, W.1; Isora Illuminated Ceilings Limited, Bedford Avenue, Slough, Bucks.; Luminated Ceilings Limited, Alliance House, Caxton Street, London, S.W.1; Siemens Edison Swan Limited, 38-39, Upper Thames Street, London, E.C.4, manufacturers of lighting units for installation with Celotex acoustic ceilings.



Corrugated strip diffusing material in a British Railways Enquiry Office



Ceiling of vinyl skin sheets giving good working light in a drawing office

Non-Linear Springs

Characteristics and design considerations applying to the suspension springs of rail vehicles

By J. L. Koffman

THE gradual reduction of the weight of passenger-carrying vehicles and particularly of railcars per ft. of body length faces designers with new and interesting problems as far as the suspension is concerned. It is now generally accepted that to ensure good riding in the vertical plane the static deflection of the helical bolster springs should not be less than about 3.5-4 in. if used in conjunction with laminated axlebox springs (1) that the overall damping factor should be about 0.2-0.25 of the critical value (1) while the damping factor of the primary suspension should be about 0.4 (2) and that the optimum distribution of the total static deflections depends on the body and bogie mass as well as on the unsprung mass and also a number of other factors relating to the vehicle behaviour in terms of its action on passengers and track (1, 2).

The problem of ensuring satisfactory riding characteristics with vehicles operating in suburban services is particularly difficult because, as far as the bolster springs are concerned, the rush-hour load can exceed the weight of the vehicle body. Consequently, a static deflection of 4 in. under tare load will mean a static deflec-

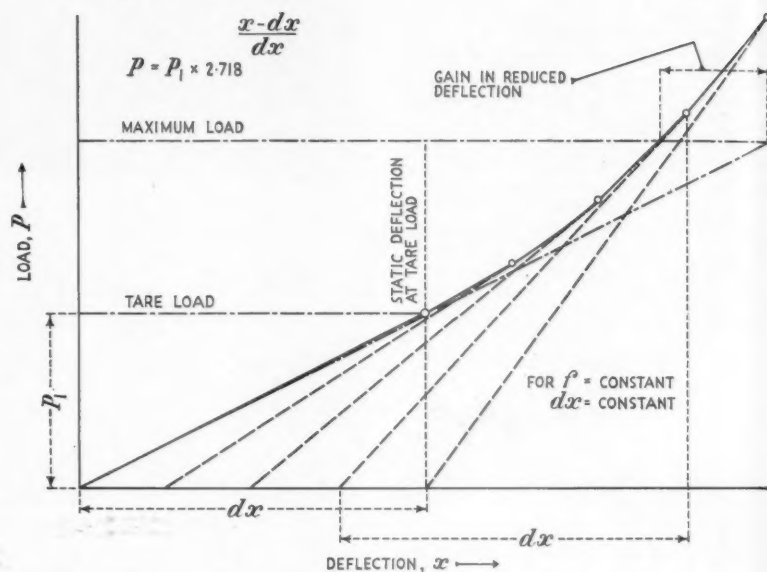


Fig. 1—To ensure a constant natural frequency between tare load and overload the load-displacement characteristics of a spring should, at every point, ensure a constant value of dx

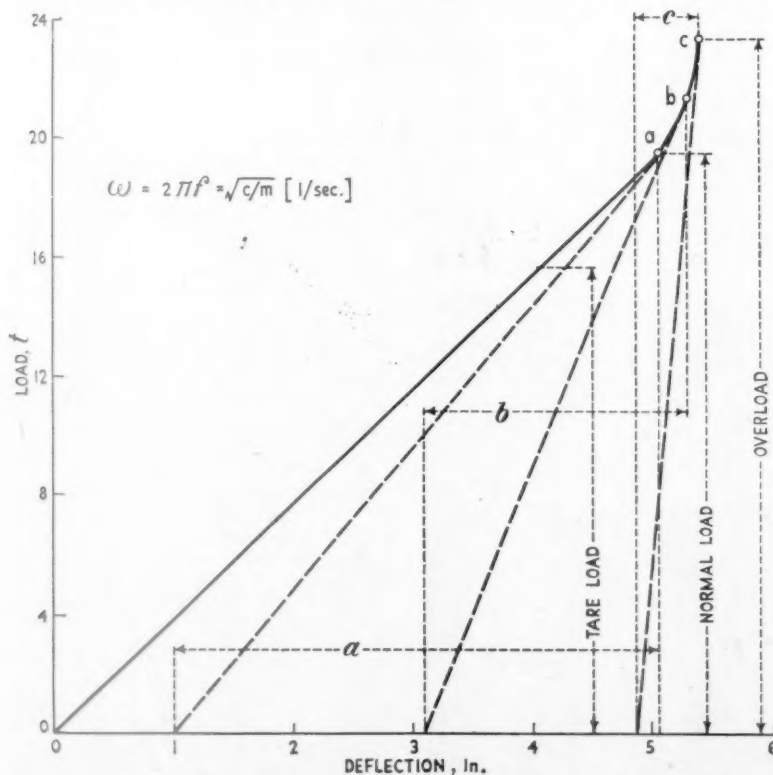


Fig. 2—The load-deflection characteristic of the bolster springs of a railcar. In this case the value of dx as represented by a , b , and c is rapidly decreased resulting in unduly stiff springs under normal load and overload

tion of 8 in. and more under overload, and to this must be added a dynamic deflection of up to 20 per cent of the static value (2), so that the springs might be subjected to a total service deflection of up to 10 in. The limiting stress level is governed by fatigue considerations which generally limit the stresses due to dynamic deflections (2) to about ± 10 tons per sq. in. which in the above case should correspond to a dynamic deflection of ± 2 in. On the other hand, the maximum spring stress should not exceed about 50 tons per sq. in., all this limiting the stress under the static load to about 20 tons per sq. in. The demands thus imposed on the suspension result in the use of large and heavy springs which, in conjunction with the deflection requirements, claim a considerable amount of space, particularly as far as clearances are concerned, while the floor level variation of 4 in. between tare and overload conditions is also not always easy to accommodate. As the natural frequency of the bolster suspension at 4 in. deflection under tare load is 1.57 cycles per sec., and this is reduced to 1.19 c.p.s. under overload due to a deflection of, say, 8 in., this leading to improved riding quality, it stands to reason that if the riding qualities are satisfactory under tare load it would be justified to design the suspension to maintain an approximately constant natural frequency regardless of the load, i.e., it would be permissible to increase the spring stiffness with increasing loads.

These considerations led to the adop-

tion of a large number of spring systems with non-linear force-deflection characteristics incorporating leaf springs with specially shaped end brackets or lever systems, helical spring nests with the individual springs brought in one by one as the load increases, rubber springs, and lately air springs with which air pressure control can ensure virtually constant natural frequency or vehicle level.

As far as more conventional springs are concerned, it may be recalled that the natural frequency is a function of the spring stiffness c [tons per in.] and the mass $m = w/g$ [ton-sec.² per in.], i.e.: $\omega = \sqrt{c/m}$ [1/sec.], or $f = (1/2\pi) \sqrt{c/m}$ [c.p.s.] = $3.13 \sqrt{1/d}$ [c.p.s.] where d [in.] is the static deflection. If the frequency is to remain constant throughout the load range then the load-deflection characteristic should be as shown in Fig. 1. The mathematical aspects of this have been considered elsewhere (3) so that it will be sufficient to mention that a constant frequency will be maintained between tare and overload as long as the deflection increment dx remains constant throughout the load range. The resultant shape of the load-deflection characteristic when dealing with loads P in excess of the tare load P_1 is plotted in Fig. 1. Here the values of deflection increments dx as represented by the subtangents of the curve remain constant and so does the natural frequency. The gain in reduced static deflection in case of a static deflection of, for example, 4 in. will be 1.3 in. at a load of twice the original magnitude, i.e., 6.7 in. instead of 8 in. It should be noted that the magnitude of dx in inches of spring deflection at any point of the curve can readily serve to determine the natural frequency at this point:—

$$f = 3.13 \sqrt{1/dx} \text{ [cycles per sec.]}$$

Heavy Overloads

General design considerations make it often necessary to deviate from the constant frequency relation, particularly when dealing with heavy overloads. Such deviations are acceptable as long as the frequency is not increased up to levels which, though possibly acceptable to standing passengers, become distinctly unpleasant to seated ones. To ensure a non-linear characteristic, rubber cones are used inside helical bolster springs and use is also made of suitable rubber springs sometimes incorporating helical springs vulcanised in them also to prevent undue barreling out of the hollow rubber cylinders. Non-linear characteristics can also be obtained by using rubber elements in series or parallel with helical springs or rubber discs stacked between steel plates and shaped to ensure a progressively increasing stiffness due to the area of rubber in contact with steel increasing with load. Last but not least, air springs will also meet these requirements. When considering non-linear suspension designs, it is necessary to bear in mind that non-linearity in itself is not a solution *per se*, and that care must be devoted to the choice of the shape of the force-displacement curve.

The force-displacement curve of a railcar for heavy suburban service is

plotted in Fig. 2. With this the static deflection of the bolster springs under static load is limited to 4.1 in. so that the natural frequency is 1.52 cycles per sec. Under normal load the deflection increases to about 5 in. but, as indicated by the distance a , the natural frequency will remain at about the same value as with the tare load. With overload of some 50 per cent of the maximum value at point b , the distance b along the deflection axis corresponds to 2.2 in., the resultant natural frequency being about 2.13 cycles per sec. In the circumstances this value is acceptable, although for normal service it is likely to be regarded as conducive to poor riding qualities. With full overload signified by point c and the relevant distance c corresponding to only about $\frac{1}{2}$ in., the natural frequency is increased to about 4.4 cycles per sec. This is undoubtedly on the high side even for heavy suburban service so that it would be advisable to endeavour to reduce it to about 2.5 cycles per sec. It should be generally possible to ensure a more gradual increase of the natural frequency if the influence of the design parameters and the effect of frequency on vehicle performance are clearly appreciated.

The load-deflection characteristics of spring systems ensuring a constant frequency throughout the load range with

the magnitude of the pay load not exceeding the tare load are plotted in Fig. 3. Here too, it will be noted that the specific requirements must be imposed to achieve the desired results. The gradually stiffening springs can be also effectively used to check undue angles of roll of the body on the bolster springs, particularly when, as unfortunately is often the case, the latter are unduly close together (4 ft. 6 in. and less), and this in combination with unsuitable swing link layout results in unpleasantly excessive body swaying.

Action in Lateral Plane

Non-linear characteristics are also used in the lateral plane when limits are imposed on the displacement of vehicle bodies due to hunting or when passing through curves, particularly by loading-gauge and current-collection considerations. In the case of bogie vehicles the momentary unbalanced lateral force can reach and even exceed values of 0.1g. (4). This means that vehicles incorporating double bolsters with an effective total swing link length of 25–29 in. as with the latest British Railways suburban electric railcars and standard coaches, the purely lateral displacement can be 2.5 to 3 in. respectively. As in addition the vehicle will also roll on the springs the combined angle of sway can be of the order of

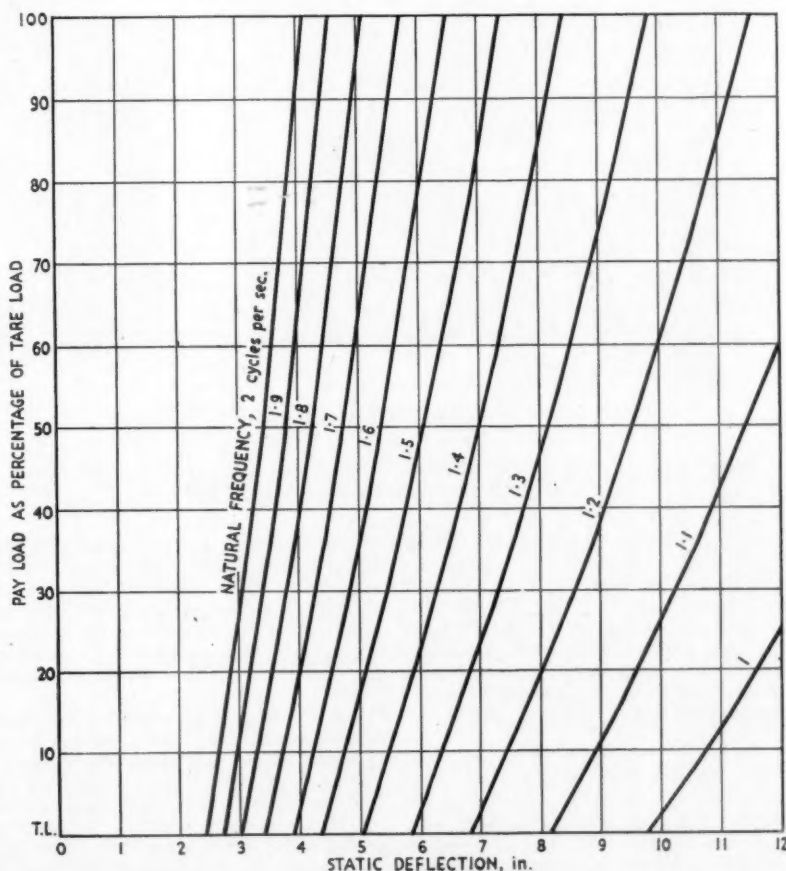


Fig. 3.—The relation between static deflection and pay load which must be met to ensure a constant natural frequency throughout a range extending from tare load (T.L.) to a load equivalent to 100 per cent of T.L.

0.03 radians (5) and, should this be considered as being on the high side, remedy might be sought by limiting the lateral displacement of the bolster.

The use of rigid stops is scarcely desirable because the resultant impacts will adversely affect the vehicle riding. With long swing links it might be of advantage to ensure a non-linear characteristic by dividing the link into two sections and limiting the motion of the upper section first. Thus, with modern German coach and railcar bogies, the 24-in. long swing links are divided into an 18.5-in.- and a 5.5-in.-long link, the first coming against a stop when the bottom end of the assembly is displaced through 17 mm. and the second after a further 8 mm. The resultant restoring

Gervais to Chamonix and Vallorcine (6) the bolster links are allowed to move through 0.63 in. before coming up against rubber bumpers. These permit a further displacement limited not to exceed a total of about 1 in., the rate of centring force increasing about three times compared with that due to swing links only. With double-bolster designs it might be desirable to limit the displacement of the inner bolster before that of the outer one, increasing the centring force about half-way through the displacement range.

Thus, in all the above cases the swing links are allowed a certain lateral displacement before affecting the original characteristic, so benefitting from the long link length in terms of low natural frequencies. The original lower rate of

of the system, i.e., the natural frequency will depend on the amplitude of the motion.

These relations are illustrated for the case of a single change in the stiffness versus displacement characteristic in Fig. 4. Here the stiffness increases from c_1 to c_2 as soon as the amplitude exceeds the value of A_1 , the overall frequency ω_1 depending on the ratio A_m/A_1 where A_m is the maximum amplitude. If the natural frequency of the system under the influence of c_1 is ω_1 then for the simple case considered here it is possible to determine the ratio of ω_1/ω_1 as a function of the amplitude ratio A_m/A_1 and the stiffness ratio c_2/c_1 where ω_1 is the natural frequency of the system oscillating at a maximum amplitude A_m , while A_1 is the amplitude of oscillation over the range controlled by c_1 only (7).

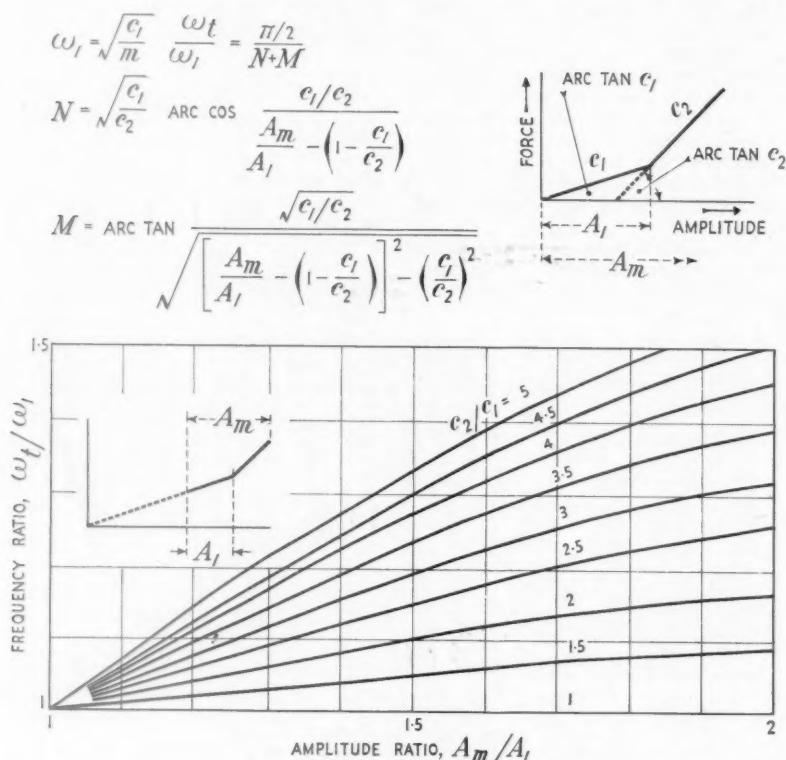


Fig. 4—The frequency ratio as affected by spring stiffness of the non-linear system and the amplitude of the oscillation

force is equivalent to 0.028g. and 0.07g. respectively while the natural frequency is increased from 0.6 to 1.33 cycles per sec., respectively (1). In the case of Italian coach bogies the bolster is carried by 14.2-in.-long articulated links the upper link coming up against a stop after passing through 0.53 in., the total lateral displacement being limited to 1½ in.

Belgian and French Practice

Articulated bolster links are also used with Class 123 Bo-Bo locomotives of the Belgian National Railways. Here, the total link length of 12 in. is reduced to about 8 in. (lower link length) as soon as the lateral displacement exceeds about ⅜ in. In the case of recent motor cars for the narrow-gauge section of the French National Railways from St.

lately centring force is exceeded only when the displacement exceeds a certain magnitude, in which case the rate is gradually increased with the aid of suitably shaped rubber units, or the stiffness is increased in a single step by altering the effective length of articulated swing links.

The use of non-linear centring devices is also beneficial by reducing the degree of coupling between bogie hunting and body nosing and swaying in the range of low amplitude and frequency oscillations.

It is clear from the relation between spring stiffness and mass that increasing the former will also increase the natural frequency. Consequently the more the amplitudes of oscillations move into the range of increased stiffness values the higher will be the natural frequency

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DIESEL LOCOMOTIVES FOR NEW ZEALAND GOVERNMENT RAILWAYS.—Tenders are being called by the New Zealand Railways Department for more 1,400-1,500 h.p. main-line diesel-electric locomotives for the North Island. Mr. M. Moohan, the Minister of Railways, has stated that prices and information on deliveries would be invited from firms manufacturing the two types of locomotives of this horsepower and now in use in New Zealand. For operation and maintenance it was desirable to have standardisation, particularly as the two types in use were giving good service. One type had been supplied by a British manufacturer and the other type had been obtained in different lots from the United States, Canada, and Australia. The tenders are being invited for alternative deliveries of either six or 12 locomotives and a decision on the number and type will be made later.

TENDERS FOR MOUNT ISA TOWNSVILLE REHABILITATION PROJECT.—An international group of companies, including Davis Construction Limited of England, has submitted the lowest tender for the first major work in the £23,200,000 reconstruction of the Mount Isa-Townsville line in Queensland. The group, which tendered £1,833,000 for the first section of 242 miles, between Richmond and Duchess, is headed by Horrocks Limited of Queensland, and, apart from the British company, also includes Kaiser Construction of the United States and Fletcher Construction of New Zealand. Utah Construction had the next lowest tender with £1,862,000. The tenders still have to be examined and the lowest need not necessarily be accepted.

RAILWAY NEWS SECTION

PERSONAL

Mr. L. Sproat, Operating Officer, North Eastern Region, British Railways, has retired.

Mr. T. E. Jackson, Freight Commercial Officer, Line Traffic Manager's Office (South Eastern Division), Southern Region, is retiring. Mr. J. K. Blue, at present Passenger Assistant, Waterloo, has been appointed to the vacant position.

clasps. On the creation of the Railway Executive in 1948, he was appointed Assistant (Signals) to the Chief Officer (Signals & Telecommunications) at headquarters, in which capacity he was engaged in policy and planning in connection with signalling standardisation. He was promoted to be Signal Engineer, Scotland, in 1955. Mr. Knotts is a Member of the Institution of Railway Signal Engineers. He is also an Associate of the Institution of Electrical Engineers.

Mr. W. M. Cann, General Manager, Smiths Industrial Instruments Limited, has been appointed General Manager of the new Industrial Division of S. Smith & Sons (England) Ltd.

Mr. H. O. Baldwin, Assistant Signal Engineer, Scotland, British Railways, who, as recorded in our July 8 issue, has been appointed Signal Engineer, Scotland, was educated at Dalziel High School, Motherwell,



Mr. L. I. M. Knotts

Signal Engineer, Scotland, British Railways, who has retired



Mr. H. O. Baldwin

Appointed Signal Engineer, Scotland, British Railways

Mr. L. I. M. Knotts, Signal Engineer, Scotland, British Railways, who, as recorded in our July 8 issue, has retired, was educated at Farnham Grammar School. He joined the London & South Western Railway in the apprenticeship grades of the Signal & Telegraph Department in 1917. After service with the Royal Flying Corps in the 1914-18 war, he entered the drawing office of the Signal & Telegraph Superintendent at Wimbledon headquarters, and subsequently occupied supervisory positions at Clapham Junction and Salisbury. Following appointments as Area Assistant in the Western and Eastern sections of the Southern Railway, Mr. Knotts became assistant (S. & T.) at Headquarters in 1935 and General Assistant in 1940. During the 1939-45 war he served as Assistant Director, Transportation Stores, 21st Army Group, with the rank of Lieutenant-Colonel. For services in the Netherlands he was appointed an Officer in the Order of Orange Nassau (M.L. Div.), and in 1953 was awarded the emergency Reserve Decoration with two

Sir Hugh Beaver has become President of the Engineers' Guild for 1961.

Mr. S. O. Screen, Assistant Line Traffic Officer (Operating), L. M. Region, Central Lines, Manchester, has retired.

Mr. J. H. Vine, Head of the Modernisation Section in the office of the Commercial Officer, Western Region, Paddington, has retired.

Mr. C. S. McLeod, Director of Industrial Relations, British Transport Commission, and Dr. J. Sharp Grant, Regional Medical Officer, Eastern Region, have been invested as Commander Brothers of the Order of St. John.

We regret to record the death of Mr. Roger Gresley, who has been Managing Director of G. Stephenson & Co. Ltd. since 1955. Mr. Gresley was the son of the late Sir Nigel Gresley, Chief Mechanical Engineer of the former L.N.E.R.

and the Royal Technical College, Glasgow. He joined the former London Midland & Scottish Railway as an apprentice in the office of the Divisional Signal & Telegraph Engineer, Glasgow, in 1930, and two years later he became an engineering apprentice. For the next eight years he received training, first in the workshops of the Signal Department at Irvine, and later with the outside staff in the Glasgow District. In 1940 he was appointed Signal Inspector, Perth, and in 1942 Signal & Telegraph Inspector, Inverness depot. He returned to Perth in 1944 as Senior Signal & Telegraph Inspector for the area, and two years later was appointed Assistant (Signals) Divisional Signal & Telegraph Engineer's Office, Glasgow. In 1947 Mr. Baldwin took up the position of Divisional Assistant (Signal & Telegraph) and in November, 1948, he was appointed Assistant Signal & Telecommunications Engineer, Scotland. This position was later redesignated Assistant Signal Engineer. Mr. Baldwin is an Associate Member of the Institution of Railway Signal Engineers.



Mr. L. H. Langworthy

Assistant Chief Stores Superintendent, Rhodesia Railways, who has retired



Mr. F. W. Austin

Appointed Assistant Chief Stores Superintendent, Rhodesia Railways



Mr. A. W. McMurdo

Appointed Assistant Civil Engineer, North Eastern Region, York

Mr. L. H. Langworthy, Assistant Chief Stores Superintendent, Rhodesia Railways, who, as recorded in our June 17 issue, has retired, joined the Beira, Mashonaland & Rhodesia Railways immediately after leaving school in 1923. He commenced his service as a junior clerk in the Stores Department headquarters, Umtali, and, after further experience in Beira, came to Bulawayo in 1949. During his service he has held several senior positions in the Department. When the Railway Mission was originally started in Umtali, Mr. Langworthy was appointed secretary of the Umtali Branch, and continued to serve in that capacity for several years until the outbreak of war in 1939. During the early years of the war Mr. Langworthy served in Palestine and Cyprus with the 1st Bn. The Sherwood Foresters. Later he served as a Staff Officer.

Mr. F. W. Austin, who, as recorded in our June 17 issue, has been appointed Assistant Chief Stores Superintendent, Rhodesia Rail-

ways, joined the system at Umtali as a Junior Clerk in the Stores Department in May, 1922. He spent 14 years in the Stores Department, mainly at Bulawayo, but was transferred to the General Manager's Office in 1936, where he gained experience in various sections and acted as General Assistant to the General Manager on several occasions. In 1955 he was Secretary to the Commission headed by Sir Robert Inglis which investigated the administration and operation of the Railways, and later accompanied the Rhodesia Railways delegation to the Conference of General Managers of Railways in Southern Africa which was held at Nairobi. In 1957 he was Administrative Secretary to the same Conference when it was held at Victoria Falls. In the Commercial Department he was appointed Assistant Superintendent in 1956, being chiefly concerned with the implementation of the railways new claims policy and the development of the system's advertising and publicity activities. He was also largely concerned with the building up

of the Investigation Section, and was Chairman of Rhodesia Railways' Magazine Committee on which he will continue to serve as a member. Mr. Austin is Vice-Chairman of the Institute of Transport in Rhodesia. He is also well known for his long association with the St. John Ambulance Brigade. He qualified as A.M.Inst.T. in 1937 and was awarded the M.B.E. in 1943.

Mr. A. W. McMurdo, District Engineer, Wolverhampton, North Eastern Region, who, as recorded in our July 22 issue, has been appointed Assistant Civil Engineer, North Eastern Region, York, obtained his degree at Glasgow University and entered the service of the L.M.S.R. in 1932 as a civil engineering pupil in the Presidents' Scheme. Mobilised as a member of the Supplementary Reserve in 1939, he served at home and abroad in the Royal Engineers until 1946, when he was demobilised with the rank of Lieutenant-Colonel. During this period he was awarded the M.B.E. (Mil.). On his return



Mr. M. C. Thompson

Appointed Organisation & Methods Officer, General Manager's Office, Euston, L.M. Region



Mr. T. A. Germaine

Appointed Assistant Public Relations Officer, Eastern Region



Mr. T. S. Arnott

Stationmaster, Edinburgh Waverley, Scottish Region, who has retired

to railway service, Mr. McMurdo was appointed Outdoor Engineering Assistant to the District Engineer, Glasgow (Central). In 1950 he transferred to the Western Region as Assistant District Engineer, Plymouth, and while there attended a course at the Administrative Staff College, Henley-on-Thames. In 1953 he moved to Paddington in a similar capacity. In 1954 he was appointed District Engineer, Shrewsbury, and in 1957 he became District Engineer, Wolverhampton.

Mr. M. C. Thompson, Work Study Assistant to the Director of Work Study, British Transport Commission, who, as recorded in our July 15 issue, has been appointed Organisation & Methods Officer, General Manager's Office, Euston, London Midland Region, was educated at Rendcomb College, Cirencester, Gloucestershire. After service in the Royal Navy as a Radar Mechanic during the 1939-45 war, he entered Manchester University where he took his B.A. (Commerce) degree. He also gained a Diploma in Industrial Administration and Personnel Management at Manchester College of Technology. In 1950 he entered the Ministry of Supply as Labour Officer at the Atomic Energy Factory, Chester, and in 1954 he joined the Anne Shaw Organisation Limited, and was trained as a Methods Consultant. In 1956 he joined Kirklees Limited, Bury, Chemical & Rayon Manufacturers, in the position of Assistant Works Manager. Two years later he was appointed Work Study Assistant to the Director of Work Study at the B.T.C., the post he leaves for his present appointment.

Mr. T. A. Germaine, Public Relations Assistant, Eastern Region, who, as recorded in our July 15 issue, has been appointed Assistant Public Relations Officer, was educated at the City of London School, and joined the L.N.E.R. in 1930 in the Locomotive Running Department. After employment in both the General and Engine Diagramming Sections, he transferred to the Passenger Department, and obtained station experience. In 1938, Mr. Germaine was transferred to the General Manager's Office, Kings Cross, on Wages Staff duties. Mr. Germaine joined the Artists' Rifles in 1934, and he was commissioned on the outbreak of war. He became senior War Office Liaison Officer (Airborne) General Staff Officer 1, at the Ministry of Aircraft Production, with the rank of Lieutenant Colonel. He returned to the railways in 1946, and was engaged on staff duties until his promotion to the position of Public Relations Representative, General Manager's Department, in Manchester. In 1948, he was appointed to the Regional Establishment & Staff Officer's Department in London, and took up his duties as Public Relations Assistant, Eastern Region, six months later. He was awarded the O.B.E. (Mil.) in 1946, and also holds the Territorial Medal. He is a member of the Institute of Journalists.

Mr. T. S. Arnott, Stationmaster, Edinburgh Waverley, Scottish Region, British Railways, who, as recorded in our June 10 issue, has retired, joined the service of the former North British Railways as a clerk at Cowdenbeath station in 1910. He gained further experience at Crossgates, Lochgelly and Menstrie, until 1915, when he joined the army for the duration of the war. He became a relief Stationmaster in 1920, and from 1922-1945 was successively Stationmaster at Kilmany, and also Torryburn; Yardmaster, Dundee Docks; Stationmaster at Leslie, North Queensferry, Annfield Plain, Haltwhistle, Blyndon, Castleford, Selby, and Sunderland; and Yardmaster, Hull. Mr. Arnott was appointed Stationmaster, Edinburgh Waverley, in 1945.

Mr. R. M. Shand, Stationmaster, Perth, Scottish Region, who, as recorded in our July 15 issue, has been appointed Stationmaster, Edinburgh Waverley, joined the former Great North of Scotland Railway as a clerk at Pitfodels in 1920, and gained experience at various stations in the Aberdeen district. He was a relief clerk for a number of years, and during each summer season from 1930 to 1937 he was agent at Braemar. Mr. Shand was appointed Stationmaster, Ballater, in 1943, and in 1947 he moved to Mallaig in a similar capacity. He became Stationmaster, Newark (North Gate), in 1951, and at Leeds (Central) in 1955. Mr. Shand returned to Scotland in 1958 as Stationmaster, Perth.

Mr. J. H. Williams, Equipment Engineer (Road Services), London Transport, who, as recorded in our June 10 issue, has recently retired, entered the Sopwith Aviation Company works at Kingston-upon-Thames as an articulated apprentice in 1915. After commissioned service in the Royal Air Force, he returned to the Sopwith Aviation Company in 1919 and completed his apprenticeship. In 1920, Mr. Williams joined the London General Omnibus Co. Ltd. in the Experimental Department, being concerned particularly with investigations into carburation and fuels. He was appointed District Engineer, Barking, in 1927, and later that year became Divisional Engineer with offices in Shoreditch. In 1929, he moved to Chiswick as Assistant to the Assistant Superintendent of Rolling Stock, and the following year visited the United States of America as a member of a party investigating road transport methods. On his return he was made Divisional Engineer, Cricklewood, becoming Assistant Superintendent of Rolling Stock, and an Officer of the Company in 1931, and Rolling Stock Superintendent in 1932. In 1937 he was appointed to his present position of Equipment Engineer. During the 1939-45 war he was responsible for the repair and maintenance of National Fire Service vehicles throughout the country. Mr. Williams returned to London Transport in 1946 and assisted with the South London tram conversion project.

Mr. M. H. Phelps, Engineering Assistant, New Works Section, Waterloo, has been elected an Associate Member of the Institution of Civil Engineers.

Mr. I. Townsend has been appointed Deputy Chairman of Traffic Commissioners, North Scotland, in succession to Mr. A. Robertson, who is retiring.

A.E.I. APPOINTMENTS

The following appointments have been announced by the Traction Division of Associated Electrical Industries Limited:—Mr. I. H. Cansdale to be Sales Manager, Traction Division; Mr. I. C. Way to be Deputy Sales Manager, Traction Division; Mr. I. Rostron to be Assistant Sales Manager, Traction Division; Mr. M. W. T. Rees to be Chief Engineer, Traction Projects Department, Trafford Park, and Chief Engineer, Traction Department, Rugby; Mr. E. T. Bostock to be Assistant Chief Engineer, Traction Projects Department, Manchester; Mr. I. Woodhouse to be Assistant Chief Engineer, Railway Signals Department; Mr. D. C. Webb to be Assistant Sales Manager, Railway Signals Department; Mr. J. O. Sims, to be Sales Manager, Traction Department, London; Mr. G. A. Ashton to be Assistant Sales Manager, Traction Department, London; Mr. D. W. Evans to be Assistant Sales Manager, Traction Department, Rugby; Mr. J. L. Morgan to be Assistant Chief Engineer, Traction Motor Department, Sheffield.

Mr. S. D. Herington has been appointed a Director of Lancashire United Transport Limited.

Mr. H. S. Warwick has been appointed Manager, West African Branch, Holman Bros. Ltd.

Mr. D. P. Huddie, has been appointed to the Board of Directors of Rolls-Royce Limited.

Mr. H. B. McAuslan has been appointed Assistant General Sales Manager of W. H. Dorman & Co. Ltd.

We regret to record the death of Mr. R. J. Elmes, Sales Director of Transport Brakes Limited, Bristol.

Mr. G. F. G. Hinings, General Manager, Newton Brothers (Derby) Limited, has been appointed a Director of the company.

Mr. S. H. Bailey, Publicity Manager, of Tufnol Limited, since 1934, has retired. He has been succeeded by Mr. David I. Herbert.

Mr. Hans Mäder has been appointed Sales Supervisor, Wolf Electric Tools Limited, in Switzerland.

Dr. Karl Kobelt, former President of Switzerland, is to be a Director of Lansing Bagnall Holding Limited and Lansing Bagnall A.G. Limited, Swiss subsidiaries of Lansing Bagnall Limited.

Mr. F. Wheeler, of A. Dunham Ltd., has been re-elected as Chairman of the Licensing Committee of the Road Haulage Association, and Mr. E. W. Voller, of Cattermiles (Transport) Ltd., has been re-elected Vice-Chairman.

Mr. D. A. F. Donald, Chairman & Managing Director, National Cash Register Co. Ltd., has been appointed Chairman of G. A. Harvey & Co. (London) Ltd. Sir Thomas Overy has resigned from the Chairmanship, but remains a Director.

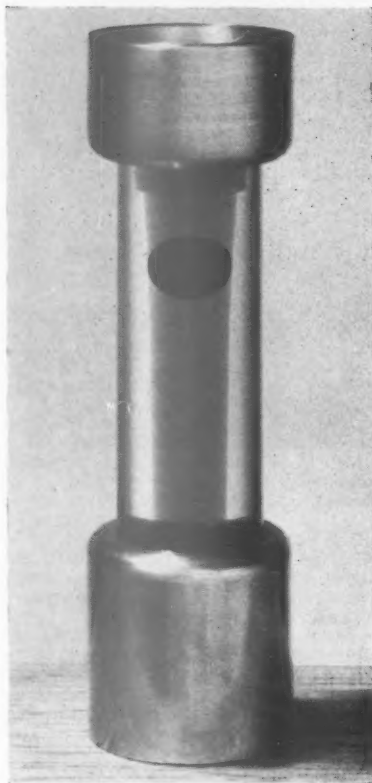
Mr. W. Brunt has been appointed a Director of Brockhouse Castings Limited, a subsidiary of J. Brockhouse & Co. Ltd. Dr. J. Grieve has been appointed General Manager of Brockhouse Castings Limited in succession to Mr. Brunt who has retired from that position, but will continue as a consultant.

The United Steel Co. Ltd. has announced the following changes:—Mr. E. B. Rees has resigned from the position of Export Manager; Mr. H. A. A. While, Manager of the London office, has been appointed General Export Manager. His duties include responsibility for the railways department. Mr. F. A. Platts will succeed Mr. While.

Mr. H. M. Henderson, formerly Managing Director of Unisteel Structural (Pty.) Limited, Cape Town, South Africa, has been appointed Director and General Manager of the Workington Iron & Steel Company branch of The United Steel Co. Ltd. He succeeds Mr. T. S. Kilpatrick who becomes Director & General Manager of the Steel, Peech & Tozer branch.

The Workington Iron & Steel Co., branch of The United Steel Co. Ltd., has announced the following appointments:—Mr. G. Pott, to be Chief Engineer; Mr. W. Hunter, to be Ironworks Superintendent; Mr. F. Greenhalgh succeeds Mr. Hunter as Blast Furnace Manager; Mr. J. D. Young, Bessemer Manager, to be Assistant Steelworks Superintendent; Mr. G. Forster succeeds Mr. Young.

NEW EQUIPMENT AND PROCESSES



Lubrication Flow Indicators

MUNTZ direct-flow indicators, for use with the mechanical lubrication of all forms of machinery, operate on the ball-and-tube principle which eliminates the need for a filling liquid. They have been developed to overcome the difficulty of indicating small flows which has arisen since the introduction of additive oils.

In some cases the characteristics of the oil prevent the conventional flow indicator from working at all. In others reasonable results can only be obtained if the glasses are removed frequently for cleaning and maintenance.

The basic unit consists of a ball in a transparent tube with a tapered bore. An indication of the actual flow rate is obtained because as flow increases the ball rises in the tube. This neat and easy-to-read device is manufactured in three forms, all designed to operate at pressures up to 1,000 lb. per sq. in. The three types are:—

(i) A standard single indicator suitable for inclusion in any oil line. This is mounted in a brass body designed to take Simplifit couplings.

(ii) A replacement indicator which can be substituted directly for other types of sight glass. It is made in three of the most common sizes used with mechanical lubricators.

(iii) A multi-point panel which is extremely compact. All the units are grouped so that it is possible to check the various flows almost at a glance. The standard panel contains 28 units mounted in two horizontal banks of 14, one above the other, with an identification chart between. The front is 14 in. wide by 6 in. high. Standard fittings include adaptors at the back of the panel

for $\frac{1}{4}$ -in. outside-diameter steel pipes.

The fact that the indicators do not contain special liquids removes one cause of oil contamination and also simplifies fitting. All components are manufactured to close tolerances and are fully interchangeable.

Further details may be obtained from Alan Muntz & Co. Ltd., Browells Lane, Feltham, Middlesex.

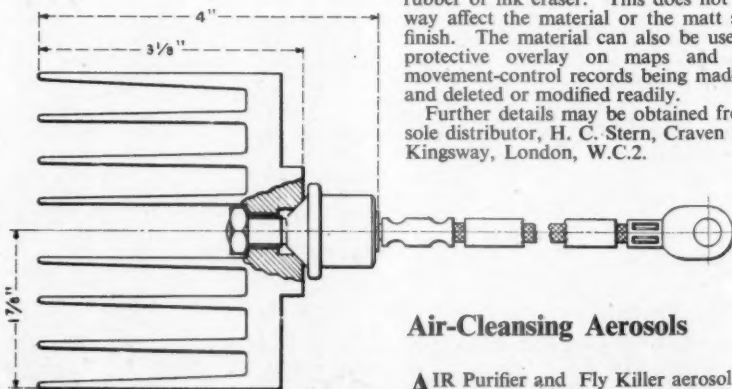
Germanium Rectifiers

THE G.10 and G.50 series of semiconductor rectifiers for general use, and particularly in association with a.c. electrical generation and installations for railway rolling stock, has been developed by J. Stone & Co. (Deptford) Ltd.

In many applications germanium semiconductor rectifiers can supersede the much larger selenium and mercury rectifiers. The main advantage claimed for the semiconductor is higher efficiency; rectifiers built with G.10 or G.50 units should benefit from their long life and stability characteristics. All the highly specialised manufacturing processes, from refining the extremely pure materials to testing finished products, are under strict laboratory control in a specially constructed air-conditioned plant.

A unique feature of the G.50 cell is the conical seating at the base for good thermal contact without undue mechanical stress. This is shown in the illustration in which the cell is mounted on a Series "C" cooling fin viewed in end elevation and available in various lengths for either natural-convection or forced cooling. The lead shown to the right is an integral part of the unit.

Cells should not be operated without a heat sink of some kind even in applications where no forward current is passed; otherwise, because of the non-linear increase in leakage-current with rise in temperature, there is a risk of thermal-runaway. Provision must be made to suppress surges from transformer switching, and any possible short-circuit current per cell must be limited to about seven times normal rating, i.e., 15 per cent impedance.



A typical example of performance, that for the G.50B cell, allows for a maximum mean d.c. of 55 A., a one-cycle surge rating of 1,000 A. peak, with maximum input at 100 V. both repetitive and momentary. For the above rating the base temperature should not exceed 140°F. and the storage temperature 167°F.

Further details may be obtained from

the manufacturer, J. Stone & Co. (Deptford) Ltd., Semi-conductor Department, Gatwick Road, Crawley, Sussex.

Flexible Hose and Fittings

THE Hi-Flex 1104 is a Neoprene hose with a range of push-in end fittings. Of flax-braid construction, it offers maximum resistance to swelling and ageing. The push-in end fittings will "hold" without the use of conventional clamps or clips. Replacement time is 5 sec.

The one-braid hose is available in bore sizes up to 1 in., and will give a working pressure of 300 lb. per sq. in. Crimped-end fittings are recommended for use with two-braid hose allowing working pressures up to 800 lb. per sq. in. These are factory-fitted to suit individual requirement.

Further details can be obtained from B. T. R. Industries Limited, Herga House, Vincent Square, London, S.W.1.

Plastic Sheet Drawing Material

KODATRACE is a translucent cellulose-plastic sheet material having a matt finish on one side to provide a tooth for the reception of pencil or ink lines. It has been devised for use in engineering drawing offices and in cartography, and is blue-tinted to about the same extent as is the conventional type of tracing linen. It is non-inflammable.

Advantages claimed over other drawing materials are: greater dimensional stability under varying conditions of humidity and temperature; a high degree of contact transparency; perfect uniformity of texture; matt surface specially prepared for easy drawing and to take pencil or ink equally well without any preparation or chalk; lies flat but can easily be rolled for storage; is very tough and impervious to water and many organic solvents; is not subject to attacks by moulds, fungi, insects, or vermin.

Drawings on Kodatrace can be erased by the use of a cloth moistened with water or a suitable solvent, or by means of an india-rubber or ink eraser. This does not in any way affect the material or the matt surface finish. The material can also be used as a protective overlay on maps and charts, movement-control records being made on it and deleted or modified readily.

Further details may be obtained from the sole distributor, H. C. Stern, Craven House, Kingsway, London, W.C.2.

Air-Cleansing Aerosols

AIR Purifier and Fly Killer aerosol sprays are now available in 12-oz. (double-size) spray pressure packs. These large, economy sizes are particularly recommended for use in ships, railways, buses, coaches, airliners, and transport termini. Price, ex works, is 52s. 10d. a dozen for either product. Both are also available in 6-oz. packs at 29s. 9d. a dozen. Samples can be obtained from the Pharmaceutical Division of Durazone-Choice Products, Lovers Walk, Ballards Lane, London, N.3.

Ministry of Transport Accident Report

*Borough Market Junction, London Bridge,
January 28, 1960: British Railways, Southern Region*

Colonel D. McMullen, Inspecting Officer of Railways, Ministry of Transport, inquired into the double collision which occurred at Borough Market Junction, British Railways, Southern Region, on January 28, 1960, at 2.58 p.m.

The 1 p.m. up diesel multiple-unit train from Hastings to Charing Cross running on the up local line under clear signals collided at a converging junction with the 2.22 p.m. up electric passenger train from Hayes to Charing Cross. The rear end of the leading coach of the latter train was forced towards the down line and was struck almost immediately by the 2.53 p.m. down electric passenger train from Charing Cross to Tattenham Corner. Seven passengers, most of them in the Hayes train, suffered slight injuries or shock. The collisions caused short circuits and so opened the circuit breakers and cut off the current for the lines on which the trains were standing. Current

lever can be restored to the back-lock position thereby replacing the signal to red. The locking is released when a track-circuit ahead of the signal is occupied and the signal lever has been replaced to normal. For signal No. 19, the berth track-circuit is No. 12, which begins 146 yd. on the approach side of the signal. When track-circuit No. 13 is occupied, the signal automatically goes back to red, but signal No. 28 goes back to red only when track-circuit No. 17, the second track in advance of this signal, is occupied. Signals 19 and 28 are slotted by Metropolitan Junction, the box in advance.

Repeating of Signal Aspects

There are no block instruments, and trains are signalled by block bells and describers. There is an illuminated diagram, and each aspect of every signal is repeated by coloured lights above the respective levers. Plungers on London Bridge platforms give visual

train then embedded itself to a depth of about 1 ft. into the rear end of the leading coach of the Hayes train.

At the time of the accident there were three signalmen on duty in Borough Market box, one being a relief signalman who was learning the work. The signalman controlling up trains said that he had the "ready to start" signal for the Hayes train just as the diesel train occupied platform 7 track. He decided to keep the trains in their proper order, which meant letting the diesel train go first. He therefore cleared signal 35, described the diesel train forward to Metropolitan Junction, and on getting the slot from that box cleared signal 28. He saw its repeater change from red to yellow. At the same time he cleared signal 23 for the Hayes train to draw up to signal 18/19, and saw the repeater of signal 23 change from red to yellow. He had not then noticed the repeaters of signal 18/19, but had seen that they were

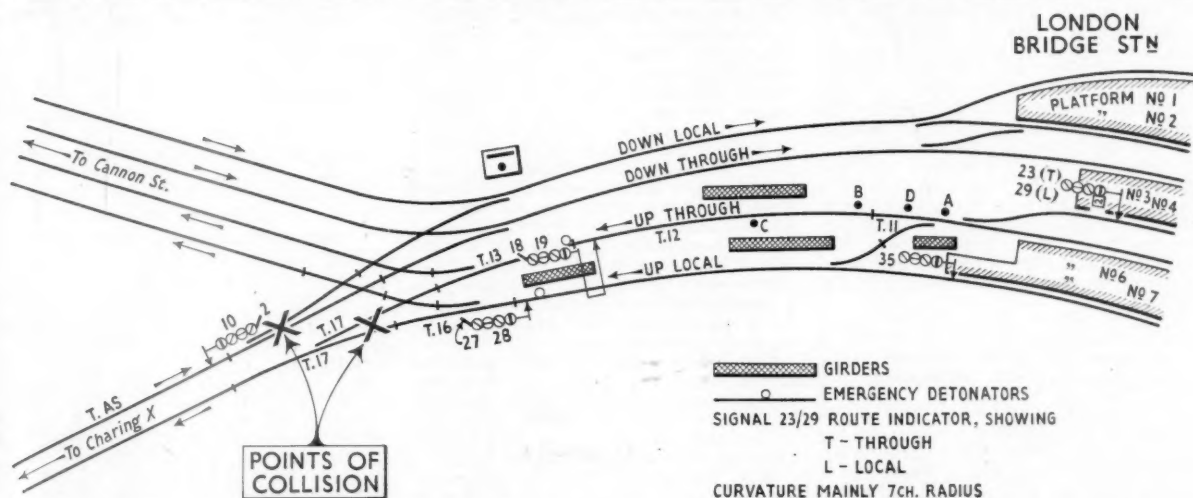


Diagram showing circumstances of accident at Borough Market Junction, London Bridge, British Railways, Southern Region, January 28, 1960

was cut off the other lines in the area at 3 p.m. Ambulances, the fire service and the police were quickly on the scene, and passengers were detained and conducted clear of the scene by 3.30 p.m.

Lines were cleared and repaired and normal services were resumed by 5.6 a.m. the following morning. In the meantime emergency services were put into operation to deal with the evening homegoing traffic. The weather was cloudy and dull, but visibility was good.

Site of Accident

Borough Market is a very busy and important junction, situated mainly on bridges and viaducts. The diagram shows the layout and relevant signals and bridge girders, and also the points at which these signals can either be seen or become obscured.

Because of the severe curvature, the speed of trains through the junction is restricted to 20 m.p.h. Borough Market signalbox contains a miniature 35-lever power frame, controlling points and signals. There is continuous track-circuiting, providing the usual controls over points and signals. In particular, when a signal has been cleared, it is "approach locked" by the occupation of the berth track circuit in its rear, but the

"train ready to start" indications in Borough Market box. There are mechanically-operated detonator placers.

Drivers' View of Signals

Signal 18/19 can first be seen by the driver of a train on the up through line when he reaches point A. Between points B and C it is obscured by a girder. The signal is focused towards point C, and so its light aspect is not brilliant when seen from between points A and B.

Signal 27/28, applying to the up local line, can be seen by a driver on the up through line when between points D and B and again when beyond point C. It is focused towards the up local line, and its aspects are not brilliant when seen from the up through line.

When the two signals are both in view from the up through line, 27/28 is considerably to the left and less brilliant than 18/19.

The diesel train running through platform 7 did not stop at London Bridge, and initially was slightly ahead of the Hayes train which had stopped at platform 4. But the Hayes train overtook it, so that when they converged the diesel train struck a glancing blow to the rear end of the Hayes train's leading coach. The front coach of the down Tattenham

red after the preceding train had passed.

He then noticed that the Hayes train was passing the box and realised that it must have passed signal 18/19. He immediately placed lever 28 in the back lock position, but saw that the signal had already been put back to red by the Hayes train occupying track 17.

Order of Train Running

He was quite definite that he had not changed his mind about the order in which the two trains were to run. He agreed that, if he had cleared signal 19 for the Hayes train, he could have replaced it to danger before that train had reached track 12, and he could then have re-set the route for the diesel train, but he was emphatic that he had not done so. There was no object in altering a route once set up, unless a train was delayed; he would do it then only after warning a driver.

The down-side signalman was watching the relief signalman working the down side. He confirmed his up-side colleague's evidence. In particular he was certain that his colleague had not changed his mind about the order in which the trains would run. He said that that was never done.

The relief-signalman described how he had

(legitimately) set the road and pulled off for the parallel movement of the down Tattenham train. As soon as he heard that the Hayes train had run through its signal, he put the lever of 10 signal into the back-lock position.

The signalman at Metropolitan Junction confirmed that the diesel train had been described to him, and that the Hayes train had not been described before the diesel train.

Hayes Train Driver's Evidence

The driver of the Hayes train said that when the guard gave him "right away" from London Bridge, signal 23 had already changed to yellow, and the route indicator showed "T" for the through line. He continued: "I stepped across my cab and opened up the controls in a standing position and remained in that position until I thought I saw this yellow aspect (on signal 19) for me to proceed to Metropolitan Junction. As far as I can remember I then adjusted my position to sit down on the driving seat, preparing myself to stop at Metropolitan Junction having been convinced that I had seen a yellow aspect to proceed. In this process of adjusting my position—after I had adjusted myself—I naturally looked for the points, saw they were set for my correct route and I proceeded, as I said, preparing myself to stop at Metropolitan Junction home signal." He said he never went through Borough Market at more than 10-12 m.p.h. After describing the collision, he agreed that having seen signal 23 at yellow he expected to find 19 at red, but was not surprised when he thought he saw it at yellow, as it was frequently cleared before it came into view. Having once seen it he did not keep it in view until it became obscured by the girder, because he was settling himself down. Nor did he look at it when it reappeared beyond the girder, because by then he was looking at points.

It was his habit to do so, first because in some weather conditions it was difficult to see the signal's aspect and also whether the junction indicator was illuminated, and second, he said, "because the margin of safety is so narrow and if by chance we had a wrong signal there is no margin to bring a train to a stand if the points are set in the wrong direction." He added, "normally at junctions one does look at points automatically except under conditions of darkness, of course."

Previous Wrong Signal Alleged

He added that about 18 months before he had had a wrong signal, corrected before he reached it. When it was suggested to him that he might by mistake have seen the yellow aspect of signal 27/28 on the up local line, he replied: "Well, the only explanation I can offer to that is, I probably started my train up at reduced speed and from experience, knowing I could run at a certain speed before I approached this signal, allowing myself time to stop if necessary, I did not take pains to observe the signal at the first opportunity that presented itself."

The drivers of the other two trains involved said that they were travelling under clear signals. As soon as each driver realised that a collision was imminent, he applied his brakes, but it was too late to prevent the collision. The driver of the diesel train estimated his speed at 15 m.p.h., and the driver of the Tattenham train gave an estimate of 20 m.p.h.

Evidence was given of subsequent tests of the signalling equipment, which proved that signals 19 and 27/28 could not have been off simultaneously.

Colonel McMullen is satisfied that signal 28 was clear for the diesel train and that the signalling equipment was in good order.

Therefore signal 19 must have been showing a red aspect when the driver of the Hayes train passed it. He must therefore bear full responsibility for the accident.

If signal 19 had been cleared for the Hayes train, it could only have been replaced and the route reset for the diesel train before the Hayes train reached track 12. If so, the driver of the Hayes train could have seen it at clear for the 6-8 sec. he was between point A and the block joint just short of B, and if its lever had been replaced during that period, he could have seen the aspect change. Colonel McMullen accepted the signalman's evidence that the route was not changed.

He thinks the most likely explanation of the Hayes driver's failure to observe signal 19 is the one given by him, namely that he did not see signal 19 when it first came in view at point A, and that later from near point D he mistook signal 28 for signal 19. Both signals were away to the left. By the time signal 19 came in view again at point C, he was looking at the lie of the points and so missed it.

Neither of the other two drivers involved could have avoided this accident. Nor can the guard of the Hayes train be blamed.

Medical Investigation

Colonel McMullen says that it is difficult to understand how the driver could have failed, even momentarily, to see this signal when it came in view the second time. It was then in full focus and more or less straight ahead. He was well acquainted with the route and was in good health. The circumstances of the accident have, therefore, been made known to the Medical Research Council which is assisting the British Transport Commission in an investigation into failures of this nature.

The Hayes driver suggested that it is the normal practice to look at the lie of points when passing through busy junctions. This is a natural action, Colonel McMullen says, but it should not be done to the detriment of the observance of signals.

Signal 18/19 is not easy to adjust for the most advantageous sighting. Its beam must be focused at a point not too far from the signal to ensure that the aspect will be seen in fog; and then, on account of the severe curvature, it is not brilliant when seen at a greater distance. Colonel McMullen recommends, therefore, that consideration should be given to providing the signal with a wide-angle lens. In view of the slow speed of trains through the junction, the small reduction in brilliance of the wider beam should not make it difficult for the signal to be seen at close range during fog.

The shortness of the overlaps and the density of the traffic means that the overrun of a signal creates a considerable risk of a collision. Colonel McMullen therefore recommends the installation of additional detonator placers to co-act with the signals.

Extension of Approach Locking

While he is satisfied that the route was not changed ahead of the Hayes train, Colonel McMullen recommends that consideration be given to extending the approach locking of the signals back to the point where each signal comes into view. This is in accordance with modern practice.

In conclusion, Colonel McMullen says that although this accident caused vast inconvenience to people travelling to their homes, he considers that the arrangements made by the railway officials for dealing with this very difficult situation were commendable. The staff of the departments concerned are also to be congratulated on their work in clearing the lines and repairing the track and signalling so as to enable the normal passenger services to be run on the following morning.

Parliamentary Notes

Heavy Loads by Rail

Mr. Ernest Marples, Minister of Transport, in a general debate on road traffic on July 28 announced additional road plans which will involve an increase in Government expenditure from this year's figure of £65,000,000 to £76,000,000 next year and to £88,000,000 in the following.

Mr. E. Popplewell (Newcastle-on-Tyne W.—Lab.) said that 24,000,000 ton-miles of goods traffic was running on the roads compared with 17,000,000-18,000,000 tons by rail. This showed that the Minister was prepared to allow this cumbersome and heavy traffic to continue to pour on to the roads. They were not here concerned with the "C"-licence traffic of the small businessman using a van for his own deliveries. The real congestion on the roads was caused by the many heavy vehicles. The Minister had not indicated any thought in this direction but was allowing a complete free-for-all.

The Government, he added, had allowed another phase of bad planning. New factories were built well away from railway sidings, forcing all the traffic and the heavy machinery more and more on to the roads.

Mr. F. Blackburn (Stalybridge & Hyde—Lab.) said that everyone would agree that much of this road traffic ought to be diverted to the railways. He cited a speech by Sir Winston Churchill when, as Chancellor of the Exchequer, he made his first raid on the Road Fund in 1926. He had stated that he was doing this partly to help the railways. In those days the railways were privately owned and, therefore, it was all right for a Conservative Government to help them.

Rail-and-Road Vehicle Necessary

Road traffic, Mr. Blackburn added, had developed to its present extent because of the importance of door-to-door delivery. They could still have door-to-door delivery if they had a rail-and-road vehicle on the railways.

Mr. Wedgwood Benn (Bristol S.E.—Lab.) said that the work of this Government and, indeed, of this generation, would be judged not purely by their approach to the motorcar, but by whether they modernised their transport system in time to take advantage of the benefits that flowed from modernisation. They must ensure the best use of all the transport facilities available. Modernisation of British transport in all its aspects called for a very substantial increase in investment.

No Co-ordinated Transport Policy

His main charge, Mr. Benn went on, was that the Government had no co-ordinated transport policy. The Ministry of Civil Aviation subsidised airfields to the extent of £10,000,000 a year and thus enabled British European Airways to compete favourably with British Railways in transporting people to Scotland. The Victoria Line tube, which would relieve congestion in London and would be a form of expenditure which could be undertaken at once, was postponed again and again and there was no likelihood of an immediate decision. Many of the faults did not lie with the B.T.C. or the local authorities or any other scapegoat which the Minister had found. The responsibility for important decisions lay with the Minister, and he was not taking them.

Artificial Channelling of Traffic

Mr. John Hay, Joint Parliamentary Secretary, Ministry of Transport, concluding the debate, said that it was necessary to take account of all the forms of transport. Much was said of the undesirability of clogging the roads with traffic while the railways were not paying their way. This raised the question

whether they should artificially divert traffic from road to rail. The Opposition seemed to think that, somehow, this should be done. That was not the Government view.

If it was cheaper for a manufacturer or trader to send his goods by rail, then he would certainly do so. The fact that goods were sent by road instead of by rail showed that traders and manufacturers thought that it is more efficient and more economical to use the roads.

It would be wrong, Mr. Hay added, to try artificially to introduce some kind of diversion to persuade or to direct people to use the railways rather than the roads. The Government did not intend to interfere with the normal working of economic processes. What they wanted was a highly modernised road and railway system. Let a person take his choice of the two in transporting his goods.

Commons to Discuss Railway Finance

Mr. R. A. Butler, as Leader of the House of Commons, announced on July 28 that on October 26 (the day before Parliament prorogued) a debate would take place on the report for 1959 of the B.T.C., and on the recent report of the Select Committee on Nationalised Industries, on railways.

Mr. Hugh Gaitskell, Leader of the Opposition, asked if Mr. Butler could say whether he expected that the report of the Stedeford committee would have been received by then, and requested an assurance that, if so, it would also be part of the subject of the debate.

Mr. Butler: The report will be to the Government, but it would, naturally, be hoped that it would have been received and, therefore, lend more colour to the observations of Ministers in the debate.

Mr. Gaitskell: I was aware that the Stedeford Committee would be reporting to the Government. We are concerned about whether we on this side of the House shall know what it reports to the Government, and, in particular, what are the intentions of the Government regarding any proposals made. Can the Leader of the House assure us that these will be published in a suitable form, perhaps as a White Paper?

Mr. Butler: At this early date I can give no absolute undertaking. I would only add the hope that the Government will be sufficiently informed by this date.

Expenditure on British Railways

Lord Brocket, speaking in the House of Lords on July 26, on the Finance Bill, mentioned Para. 210 of the report of the Select Committee on Nationalised Industries, where it was stated that £161 million was being spent on electrifying the line between Manchester and Liverpool and Euston. In Para. 222, he pointed out, the report stated: "In giving a banker's sanction to the expenditure on the London Midland electrification for example, the Ministry did not know what the alternative expenditure in using diesel locomotion would be."

It was incredible, he added, that a business of the size of the nationalised railways should undertake an expenditure of £161 million—probably more by the time it was finished, if it was finished, and he hoped it would never be—and the Ministry should not know what the alternative expenditure might be if it had gone in for dieselisation and not electrification.

In Para. 224 the report stated: "The Departmental witnesses could say, 'I see no prospect at all that they (the Commission) will be able to service the new capital and pay on the old'; and even the increases in traffic that modernisation has brought in the last few years are not, in their opinion, enough to leave one other than pessimistic."

Questions in Parliament

Independence for Railway Regions

Mr. P. W. Holland (Acton—C.) asked the Minister of Transport on July 27 when he expected to take the necessary steps to give a greater degree of independence to the Regions of British Railways.

Mr. Ernest Marples: I am not yet in a position to make a statement.

Mr. Holland: Many older railwaymen who form the hard core of the service still think with pride of, for example, a Region's safety record or good timekeeping record. We should do what we can to bring about a revival of this pride throughout the service by enabling Regions to have a greater degree of independence.

Mr. Marples: A special advisory group is taking evidence from all classes of people, and I am sure that it will bear this in mind before it makes its recommendations.

Mr. Wedgwood Benn (Bristol S.E.—Lab.): As the Select Committee has made a very thorough investigation of the railways and has presented a report on the matter, will the Minister give an assurance that no action will be taken on the Stedeford Committee recommendations until the House has had an opportunity to debate his own proposals in a White Paper that we can put side by side with the Select Committee's report?

Mr. Marples: De-centralisation or any alteration of the areas would require legislation, and so discussions would be automatic.

Railway Superannuitants

Mr. H. Hynd (Accrington—Lab.) asked the Minister of Transport on July 27, whether the terms of reference of the Special Advisory Group on the B.T.C. would enable it to consider the problem of railway superannuitants who were in receipt of out-of-date pensions.

Mr. Ernest Marples, in a written answer: The Special Advisory Group has been made aware of this problem and will no doubt bear it in mind in advising me. I do not think it would be right for me to ask the Group for early advice on this subject in isolation.

Staff and Labour Matters

L.T.E. Incentive Bonus Scheme

The following notice was issued on July 26 to drivers and conductors by Mr. J. B. Burnell, Operating Manager, Central Road Services, London Transport Executive:—

"I have, in the past, repeatedly spoken bluntly to you and have never denied you the same right in reverse, and we have frequently availed ourselves of this facility. Here is what I think in regard to the incentive bonus scheme:—

"London Transport feel that the public should get a better service, and London Transport feel that you should share in the increased takings that would come from this.

"London Transport also feel that you should share in savings in operating costs that are made; also that any and every man should be capable of influencing his individual earnings by his own effort. In addition, that those of you who have driven and conducted buses with safety over the years, should get an added reward.

"With all these objects in view, the incentive bonus scheme was devised and I, personally, felt that while no single remedy would beat the staff shortage, this scheme would have gone a very long way to do just that.

"We were also prepared to ease the

conditions at weekends and add to the allowances that are already paid for various features. The bonus scheme was carefully examined by the negotiating committee of the Transport & General Workers' Union. After this examination and after amendments had been made to the scheme to meet points made by the negotiating committee, the negotiating committee recommended it for acceptance to a joint delegate conference. The joint delegate conference rejected the proposals.

"It seems to me, and I cannot put it in any other way, a tragedy that this attempt to solve our mutual difficulties has been turned down, and I cannot help thinking that if you all had known the benefits of the scheme you would have at least been willing to try it as an experiment for six months."

London Transport Power Station Staff

Maintenance workers at London Transport power stations—Lots Road, Neasden and Greenwich—commenced an unofficial strike yesterday because of a dispute in regard to overtime payments.

Under the recent settlement which followed the previous unofficial strike, the men received an allowance of 10s. a week to cover unpleasant conditions, and it was also agreed that there should be a review of rates of pay in the light of rates paid in the electricity supply industry.

The maintenance staff contends that, under the agreement which brought about the resumption of work on July 20, they are losing overtime pay amounting to 19s. to 24s. a week. The men have entitlement to payment for abnormal conditions, but the overtime payment which has given rise to the dispute was only of a temporary nature. Tube and trolleybus services have not been affected by the dispute.

COLOUR-LIGHT SIGNALLING IN THE NORTH EASTERN REGION.—New automatic colour-light signalling has recently been installed by British Railways engineers between Keighley and Steeton on the Leeds—Carlisle main line in the North Eastern Region of British Railways. On a three-mile stretch of double track, 10 new electric colour-light signals have been brought into use to replace 18 mechanical signals of the traditional semaphore type. The signals are automatically-operated by the passage of the trains and this has made possible the closing of one of the signalboxes at Keighley (Keighley North). The rails are wired in track circuits which automatically set the signals to danger as they are passed by a train. Each signal remains at red until the train is 440 yd. clear of the next signal when it will change to yellow, and subsequently to green when two sections ahead are clear. A further safety precaution is the use of double-filament lamps in the signals themselves. Should one filament fail, an automatic indication of the faulty lamp is immediately given to the signaller, with a further indication should both filaments fail. The new signals are of the standard modern type with protruding hoods to screen side reflections. They throw an intense focused beam of light, clearly visible at considerable distances and in all weathers. Each signal post is equipped with a telephone for communication between signalmen and train crews when required. The new signals are evenly spaced so that trains can follow each other more closely than formerly. The new signals and equipment were supplied by the Westinghouse Brake & Signal Co. Ltd. and the work was carried out by staff of Mr. A. F. Wigram, Signal Engineer, British Railways, North Eastern Region.

Contracts and Tenders

Signalling equipment for Victorian Railways standard-gauge project

The Victorian Government Railways has placed an order with McKenzie & Holland (Australia) Pty. Ltd. and the Westinghouse Brake & Signal Co. Ltd. for the design and installation of automatic block signalling, with C.T.C. between Melbourne and Albury at a cost of £846,580. This scheme is part of the standard-gauge link between Melbourne and Sydney. The signalling equipment will be manufactured in Australia by McKenzie & Holland at its Newport works. The C.T.C. equipment will be supplied by Westinghouse.

Two electrically-driven pneumatic grain elevators, which are to be installed at No. 3 Quay, King George Dock, Hull, have been ordered by British Transport Docks from Spencer (Melksham) Limited of Melksham, Wilts. This new equipment will be land based on portal structures and will replace existing bucket elevators. A contract for civil engineering work, entailed in the extension of the grain silo at the dock, has been placed with Taylor Woodrow Construction Limited of Southall, Middlesex. These improvements are part of the £4,750,000 improvement scheme for King George Dock, already announced.

The Export Services Branch, Board of Trade, has received calls for tenders as follows:—

From South Africa:

2 electric motor driven, power feed, oscillating triple drum sanding machines, as called for in the mechanical and electrical specifications

Independent motor driven exhaust equipment, as called for in the mechanical specification

1 set of fully dimensioned velograph or litho print, as called for in the mechanical specification.

The issuing authority is the Stores Department, South African Railways. Bids in sealed envelopes, endorsed "Tender No. G.8351: Triple Drum Sanding Machines," should be addressed to Chairman of the Tender Board, P.O. Box 7784, Johannesburg. The closing date is August 26, 1960. The Board of Trade reference is ESB/19566/60.

From Argentina:

10 breakdown trains and equipment.

The issuing authority and address to which bids should be sent is the Argentine State Railways Administration, Av. Corrientes 389, Buenos Aires. The tender No. is 27/60. The closing date is September 20, 1960. Tender documents are obtainable from the State Railways Administration at a cost of 1,000 pesos. No further information is available at the Board of Trade. The Board of Trade reference is ESB/19623/60.

100 diesel-electric shunting locomotives of which 80 are to be 5 ft. 6 in. gauge and 20 of metre gauge. Spares for the locomotives are also to be supplied.

The issuing authority and address to which bids should be sent is the Argentine State Railways Administration, Av. Corrientes 389, Buenos Aires. The tender No. is 22/60. The closing date is September 14, 1960. No further information is available at the Board of Trade. The Board of Trade reference is ESB/19622/60.

47,621 steel tyres for locomotives, coaches, and wagons.

The issuing authority and address to which bids should be sent is the Argentine

State Railways Administration, Av. Corrientes 389, Buenos Aires. The tender No. is 19/60. The closing date is September 1, 1960. Tender documents are obtainable from the State Railways Administration at a cost of 500 pesos. No further information is available from the Board of Trade. The Board of Trade reference is ESB/19621/60.

From Formosa:

5 automatic ballast tampers and spares. The issuing authority and address to which bids should be sent is the Central Trust of China, Purchasing Department, 68 Yen Ping Nan Road, Taipei, Taiwan (Formosa). The tender No. is US-785. The closing date is August 29, 1960. The Board of Trade reference is ESB/19598/60/ICA.

Further details relating to the above tenders together with photo-copies of tender documents, unless otherwise stated, can be obtained from the Branch (Lacon House, Theobald's Road, W.C.1).

The Director General, India Store Department, Government Building, Bromyard Avenue, Acton, London, W.3, invites tenders for the supply of upper and lower bolster spring planks, brake head and hanger complete, axle holding arms, brake lever connectors, and brake trusses. For further details see the official notice on page 176.

Notes and News

A.A.R. Officers Visit Swindon Works.—The delegation from the Association of American Railroads which inspected railway headquarters and installations on the Continent and in Britain, visited Swindon Works, Western Region, as recorded in our July 22 issue. There they were shown diesel-hydraulic locomotives under construction and maintenance, and other activities. The illustration shows (sixth from left) Mr. R. A. Smeddle, Chief Mechanical & Electrical Engineer,

Western Region, with, on his right, Mr. C. D. Buford, Vice-President (Operations & Maintenance Department) of the A.A.R., and other members of the delegation.

Success of New Auto Buffet at Waterloo Station.—More than 41,000 cartons of milk, 25,000 cartons of fruit squash, 18,000 cups of coffee and 5,000 snacks were served by the auto buffet at Waterloo Station, Southern Region, during the four-week period from June 19 to July 17.

Motor Rail Limited Results.—The group loss of Motor Rail Limited for the year ended March 31, 1960, amounted to £6,423 (profit £27,360) with no dividend (5 per cent.). Turnover decreased slightly and profit margins were further reduced. One reason for the decrease of turnover was reduced sales to South Africa and the Rhodesias.

Signalman Injured by Object Thrown from Train.—A trainee signalman received severe lacerations to his left arm last Monday, when a bottle thrown from the 10.30 a.m. Bristol to Newcastle express smashed through a signalbox window at Bredon, Worcs., on the Birmingham to Bristol line of the Western Region, British Railways. The culprit could not be traced.

British Transport Advertising Sales Committee.—The annual meeting was held recently in London of the British Transport Advertising Sales Committee, which consists of the British Transport Commission commercial advertising sales force throughout Britain. Those present included Messrs. George Dodson-Wells, Chief Commercial Advertising Officer; J. L. Perren, Commercial Advertising Officer; W. J. Oliver, Sales Officer; and A. Bradbury (Southampton). During the meeting Mr. Dodson-Wells presented Mr. Bradbury with a gold watch to mark his 45 years' service.

Sailing Tickets Required for Irish Ferries.—British Railways, London Midland Region, has announced that only passengers with sailing tickets can be accommodated on the morning sailings from Holyhead to Dun Laoghaire on August 3, 8, 15, 20 and 27, and on all the sailings on August 6, 13 and 14. Similarly, only passengers with sailing tickets will be allowed on the sailings from Heysham to Belfast on August 13. From Dun Laoghaire to Holyhead, sailing tickets



Mr. R. A. Smeddle with Mr. C. D. Buford, and other members of the A.A.R. delegation at Swindon Works

will be required on all sailings up to and including those on August 9, on August 12 and 13 and on the 11.35 a.m. sailings on August 20 and 27. Similarly, they will be required on the sailings from Belfast to Heysham on August 4, 5, 6, 7, 12, 19 and 26.

Internal Measuring Micrometer.—The Tesa Division of Matchless Machines Limited, 18, Bolton Street, London, W.1, announces that the Tesamic Internal micrometer for measuring blind and special bores, manufactured by Tesa S.A., Switzerland, has now been renamed Trio-o-bor internal measuring micrometer.

North Eastern Region Publicity.—Three new posters for display at stations and travel agencies throughout the country have been issued by the North Eastern Region of British Railways. The posters feature Scarborough, Harrogate, and the St. Andrew's Dock, Hull (illustrated). The Scarborough poster was designed by Forum Art Services, Southampton Row, London, W.C.1, and lithographed by Stafford & Co. Ltd., Netherfield, Nottingham. The Harrogate poster incorporates four reproductions from colour photographs of local scenes by Mr. Anthony F. Kersting. The drawing work was carried out by Tattersall Advertising Limited, Harrogate, and lithography by Chromoworks Limited, Willesden. The St. Andrew's Dock poster is from a painting by Mr. Jack Merriott, lithographed by Stafford & Co. Ltd., Netherfield, Nottingham. The original painting will be framed and presented to the President of the Hull Fish Merchants' Protection Association.

Pan American Railway Congress to be Held in Brazil.—Railway officials from all the Latin American republics, and from the United States, are meeting at Rio de Janeiro in October for the tenth Pan American Railway Congress. Five hundred people are expected to attend. The Congress is held for interchange of information about railways and their operation, so that the systems of participating countries may be made more efficient. Engineers and officials, and manufacturers of railway equipment, rolling stock, and engines, are contributing a great number of technical papers. The Congress will be held in three Brazilian cities: first, Rio de Janeiro for the technical sessions, second, Sao Paulo, where new products will be on display, and lastly, in the new capital of Brazil, Brasilia, where the Congress will be closed by an address from the Brazilian President, Mr. Kubitschek.

New Traffic Offices at Middlesbrough.—In last week's issue, as we closed for press, we reported the opening of Zetland House, the new building designed to unite Tees-side operating, motive power, and commercial staff under one roof, by Sir Ellis Hunter, Chairman & Managing Director of Dorman Long & Co. Ltd., the contractor responsible for the structural steel framework. At the opening ceremony Sir Ellis Hunter stated that the steel industry was still expanding and the essential character of the co-operation of the railways would in no way diminish as developments progress. In fact, he said, the steel industry could not do without the railways. It was naturally interested in their development and had every reason to support them. In the steel industry's expansion programmes a great deal of thought had been given to the co-ordinating of the various projects in a manner which would meet the needs of the industry's main consumers. This was an aspect which he was sure the railways would not have overlooked in their modernisation programmes. The accompanying illustration shows Mr. E. McLeland, District Operating Superintendent, Darlington, explaining the new control



SERVICE TO THE FISHING INDUSTRY

New poster depicting St. Andrew's Dock, Hull, issued by the North Eastern Region

equipment to (left to right) Mr. K. A. Kindon, Traffic Manager, Tees-side, Mr. T. H. Summerson, Chairman of the North Eastern Area Board, Sir Ellis Hunter and Alderman W. Flynn, Mayor of Middlesbrough.

Withdrawal of Freight Train Service, Ramsden Bellhouse Siding (Public).—The Eastern Region of British Railways announces that on and from Monday, August 22, the freight train service will be withdrawn from Ramsden Bellhouse Siding (Public) situated between Billericay and Wickford, on the Shenfield-Southend (Victoria) line. Facilities for freight traffic in full wagon-loads will be available at Billericay and Wickford Stations.

Floods Interrupt Services in North Wales.—Train services on the Caernarvon to Afon Wen branch of the London Midland Region, British Railways, were halted earlier this week by floods which breached an embankment near Chwilog. At Llanybi Station,

60 yd. of ballast were washed away. Thirty-six passenger and goods trains were suspended. Trains from Liverpool and London were stopped at Brynkrir and a shuttle bus service took passengers six miles to Criccieth Station.

Walker, Croweller & Co. Ltd. Telephone Number.—The new telephone number of Walker, Croweller & Co. Ltd., Whaddon Works, Cheltenham, Publicity Department is Cheltenham 56366 (4 lines).

Injunction against Commander Hawkes.—The British Transport Commission has obtained an injunction to prevent Commander G. F. Hawkes, R.N., from travelling first class on a second class ticket. Commander Hawkes had contravened the regulations repeatedly as a protest against empty first class compartments in otherwise crowded trains. In defence of his opinions, he had formulated a code which he named the "Hawkes Rules" whereby, according to



Sir Ellis Hunter, Mr. T. H. Summerson, and the Mayor of Middlesbrough inspecting the control equipment at the new traffic offices, Middlesbrough

which the holder of a second class ticket who could find no second class seat could occupy a first class seat without paying excess fare or obtaining the permission of a railway official. Under B.T.C. regulations, stationmasters, inspectors, and guards, have discretionary powers to permit second class ticket holders to occupy first class seats.

Metropolitan-Vickers-GRS Limited.—Metropolitan-Vickers-GRS Limited has changed its name to Associated Electrical Industries-GRS Limited. The change is in name only, and is made within the re-organisation of the parent company, Associated Electrical Industries Limited.

Eastern Region Bank Holiday Passenger Traffic.—British Railways, Eastern Region, carried 150,000 passengers to Southend on July 31, and August 1. Some 94,000 passengers travelled on the London, Tilbury & Southend Line, and 47,000 on the Great Eastern Line from Liverpool Street. A further 10,000 passengers travelled on the L.T. & S. Line to Benfleet for Canvey Island.

The De La Rue Co. Ltd. Results.—The group profit of the De La Rue Co. Ltd. for the year ended April 2, 1960, before taxation, rose from £1,585,694 to £2,282,382. Each of the three main subsidiaries showed a considerable improvement. Thomas De La Rue & Co. Ltd. contributed £321,186. Thomas Potterton Limited £257,124, and Formica International Limited £1,786,819. The net profit attributable to shareholders of the De La Rue Co. Ltd., after allowing for outside interests, becomes £730,862 compared with £669,598 last year.

Esso Petroleum Co. Ltd. New Technical Sales Headquarters.—The technical aspects of marketing products of the Esso Petroleum Co. Ltd. are now handled at a new headquarters which has been formed at Feltham, Middlesex. The entire Technical Sales Department with sales research laboratories, until recently housed in Vauxhall, London, has removed to an existing building in Faggs Road, Feltham, where much interior re-modelling has been carried out and a test house for engines has been built. The safeguarding and improvement of product quality and the examination of additional industrial requirements are among the responsibilities of the department.

Fire Officers Visit to British Oxygen Gases' Cricklewood Works.—Thirty Fire Service sub-officers recently visited the Sales Technical Services Department at Cricklewood, of British Oxygen Gases Limited. The officers were shown methods of production, purification, and compression of acetylene, and equipment for welding, and for machine, hand, and heavy cutting. The officers also attended a lecture on the cause and effect of flashbacks in cylinders, and their prevention. The visit was part of a month's advanced sub-officers course organised by the Fire Service Training College, Dorking, Surrey.

Overnight Services between London and N.E. England.—The Eastern and North Eastern Regions, British Railways, have introduced fast freight services giving overnight deliveries between London and the Tees-Tyne industrial area. Two named trains provide the new services which operate nightly except Sundays. The train from Kings Cross to Newcastle is called the "Tees-Tyne Freighter" and the corresponding south-bound train the "Kings Cross Freighter." Each can work up to 50 wagons. The services are available for all consignments in container or full wagon-loads; they operate to and from an extensive area of London, including Hendon, Willesden, Muswell Hill,

Clapton, New Cross, Dulwich, and Wandsworth. In the North-East the area served includes: Darlington, Gateshead, Hebburn, Low Fell (Team Valley Trading Estate), Middlesbrough, Newcastle, South Shields, Stockton, Sunderland and West Hartlepool. There are feeder services to Harrogate, Malton, Selby, Ripon, Scarborough and York. Road collection and delivery arrangements fit the pattern of the new service and door-to-door deliveries in rail-road containers are a feature.

Warning Not to Trespass.—In the longest holiday of the year, the Eastern Region, British Railways, is issuing a poster for display at stations warning children of the dangers of trespassing on the railway, more particularly where the line is electrified. Parents are asked to tell their children, and ask their children to tell their friends, that to trespass on the railway at any time is dangerous, and that where lines are electrified it is foolhardy. Children are exhorted not to climb railway fences, trespass on the line, climb electrification masts or signal posts, throw things at overhead equipment, put obstructions on the line, or throw things at trains.

Forthcoming Meetings

August 20 (Sat.).—British Railways, Southern Region, Lecture & Debating Society. Visit to Ipswich diesel depot.

September 2 (Fri.).—The Railway Club, at the Royal Scottish Corporation, Fetter Lane, E.C.4, at 7 p.m. Members' meeting and paper by Mr. H. A. Vallance on "North of Inverness."

September 3 (Sat.).—British Railways, Southern Region, Lecture & Debating Society. Visit to Redbridge sleeper depot.

September 4 (Sun.).—The Railway Correspondence & Travel Society. Cumbrian rail tour.

OFFICIAL NOTICES

PERMANENT WAY INSPECTOR

REQUIRED by EAST AFRICAN RAILWAYS AND HARBOURS, on contract for four of 36-48 months. Commencing salary according to qualifications and experience in scale (including housing factor) £1,149 to £1,425 a year. If employed on construction an additional allowance of between 10% and 20% of salary is payable. Gratuity at rate of 10% of total consolidated salary drawn. Outfit allowance £30. Free passages. Liberal leave on full salary. Candidates should be experienced as Sub Permanent Way Inspectors or Relaying or Length Gangers and they should be able to keep Muster Rolls, Store Records and Permanent Way Returns. Write to the CROWN AGENTS, 4, Millbank, London, S.W.1. State age, name in block letters, qualifications and experience and quote M2B/51013/RA.

THE DIRECTOR GENERAL, India Store Department, Government Building, Bromyard Avenue, Acton, London, W.3, invites tender for the supply of:
Tender Ref. No. 18000/60/BMB/HAL

Tenders are invited for the manufacture and supply of following components for Railway Coach manufacturing programmes: Upper and lower Bolster Spring Planks—Brake Head and Hanger complete—Axle Holding Arms—Brake Lever Connectors and Brake Trusses to drawing supplied. The tender forms with schedules and specifications which are returnable on September 5, 1960, may be obtained from the above office (Co-ordination Branch) on payment of a fee of 10s. (not refundable) for each tender.

Application for tenders should specify the above reference.

SHOTBLASTING—METAL SPRAYING—COATING. Epikote, araldite, P.T.F.E., P.T.F.C.E., Polythene, P.V.C., Neoprene and Hypalon coatings applied on Site or at Works.—**LOYNE LIMITED**, Margaret Street, Ashton-under-Lyne, Lancs. Tel. No. ASH 4551/2/3.

Railway Stock Market

An additional factor making for uncertainty and lower prices in stock markets has been the recent reaction on Wall Street. There was again no heavy selling, but buyers were even more cautious. The view has gained ground that a waiting attitude is wise because it should be easier to assess the market outlook after the autumn, which is usually the testing time for the £. At present sterling is holding steady, because since the rise in bank rate to 6 per cent, foreign funds have been flowing back to London. The outlook for the £ will depend on our export trade. So far it cannot be said that the credit squeeze, which aims at damping down expansion in the home market, is inducing firms to give increased attention to overseas trade. A move in this direction takes time. It is early days yet to assess the pros and cons of the credit squeeze.

An uncertain factor is the attitude of the new Chancellor of the Exchequer, Mr. Selwyn Lloyd, on matters such as the credit squeeze. The City is worried by the exceptionally large rise of nearly £100,000,000 in bank loans shown by the latest figures. If the rise is not checked it is regarded as probable that the banks will be asked to make a fresh increase in the special deposits they have to place with the Bank of England.

Movements in foreign rails were small. Costa Rica ordinary stock held its recent rise, changing hands at 42½. Brazil Railway bonds were 6½, Chilean Northern 5 per cent first debentures have been dealt in between 56 and 57½, and Antofagasta ordinary stock at 12½, compared with 13 a week ago, while the preference stock was 29½xd compared with 31½xd.

Mexican Central bearer debentures were 60 and Sao Paulo Railway 3s. units 1s. 1½d. while United of Havana second income stock was again quoted at 6.

Midi 4 per cent sterling bonds held steady at 86, at which the yield is 4½ per cent.

Canadian Pacific at \$42½ compared with \$42½ a week ago, having reflected the trend on Wall Street. The preference stock was at 55½ and the 4 per cent debentures 61½. White Pass shares were little changed at \$11½.

Nyasaland Railways shares remained at 9s. 6d.; the 3½ per cent debentures changed hands at 46½.

Among shares of locomotive builders and engineers, G. D. Peters were again quoted at 16s. 3d. Beyer Peacock 5s. shares have been steady at 7s. 1½d. Charles Roberts 5s. shares eased to 10s. 3d. at which there is yield of nearly 7 per cent on the basis of last year's 15 per cent dividend. Birmingham Wagon strengthened to 39s., North British Locomotive were easier at 16s. 6d.; Gloucester Wagon 10s. shares have changed hands around 13s.; and elsewhere, Wagon Repairs 5s. shares were 12s. 9d.

Dowty Group 10s. shares at 36s. 3d. have been firm on the results, but Pressed Steel 5s. shares eased to 28s. with the general trend of markets, while Vickers have come back to 30s. 3d., at which there is a yield of 6½ per cent. Westinghouse Brake were steady at 45s. and Metal Industries better on balance at 66s. 6d.xd, but after improving after the good results, Murex eased to 72s. 6d.

Associated Electrical at 49s. 7½d. were unable to move against the easier trend of markets, despite news of the joint enterprise with Davy-United in the field of automation for the steel industry. General Electric fell sharply to 33s., a new low level for the year because of Sir Leslie Gamage's cautious annual statement. English Electric at 36s. 3d. were also at virtually their lowest for the year. Crompton Parkinson 5s. shares changed hands around 13s. 9d.

